ANNEX B

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JUN 06 2007
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Les Bennett
Appl. No.: 10/682,209
Filed : 10/08/2003
Title : Printing Web Cleaner
Art Unit : 1744
Examiner : David A. Redding
Docket No.: PLI-1184

DECLARATION of Les Bennett

I, Les Bennett, hereby declare and state as follows:

1. I am a Director of Predictive Maintenance Company Ltd, also known as PDM Ltd, of 27 Lyndale Road, Bingley, West Yorkshire BD16 3HE, United Kingdom. I have held this position since October 1991. PDM Ltd is a company engaged in the development, manufacture and sale of web cleaning apparatus for the printing industry.
2. After gaining a B.Sc.(Eng) Honours degree in engineering from King's College, London University, I held a variety of positions in product development with the Plessey Co., (military communication equipment) and in manufacturing with General Electric (Industrial control equipment). I then obtained an MBA from Manchester Business School and was recruited by Vickers, where I was appointed Sales & Marketing Director to their Crabtree-Vickers business unit, a company manufacturing printing machinery, including Newspaper printing presses. In 1984 I founded Lee James Graphic Systems Ltd., a company marketing specialist products to the printing industry in UK and Europe. In 1991 I founded PDM Ltd. (Predictive Maintenance Company Ltd.) as a vehicle to develop specialist web cleaning equipment to meet the specific needs for the printing industry.
3. I am a named inventor in respect of the US patent application serial no 10/682, 209
4. I am aware that claims 1, 2, 4-19 stand rejected under 35 U.S.C. 102(a) as being anticipated by publication 2003/0046787 (Howard) and further that claim 3 is rejected under 35 U. S. C. 103(a) in view of US 6 598 261 (Howard)

5. I am further aware that in the response to the office action of 7 March 2007 submitted herewith claim 1 is deleted and claim 3 is amended to incorporate the subject matter formerly in claim 1. Thus claim 3 is an independent claim which includes, *inter alia* the limitation that "said pair of counter rotating rollers each have a smooth outside surface which is capable of creating the air currents".

6. Immediately prior to the time of making the invention defined in new claim 3, I was working with Paul Howard on the development of the web cleaning apparatus as described in US 6 598 261, of which Howard is the inventor.

7. I appreciated that it was desirable to gain a better understanding of the action of the rollers in generating air currents, and of the nature of the air currents generated.

8. I also appreciated, however, that constructing test apparatus to measure directly the air currents generated in different circumstances would be prohibitively time consuming and expensive.

9. I decided to commission a feasibility study to assess whether the nature of the air currents could be investigated by computer modelling. The feasibility study was carried out by The University of Sheffield, England on the basis of a contract signed on or about 7 February 2002.

10. A copy of the Feasibility Study Report from the University of Sheffield is attached as Annex A.

11. At the time of commissioning the feasibility study I was skeptical as to whether the results would be of value. My understanding and belief at that time was that rollers having a rough or textured outer surface, such as cotton tufted rollers, were necessary in order to generate the required air currents whereas the CFD (Computational Fluid Dynamics) analysis technique which The University of Sheffield proposed to use was capable of modelling only smooth-surfaced rollers.

12. The Feasibility Study Report by The University of Sheffield is dated 4 March 2002 and was received by me the following day, that is, 5 March 2002.

13. On reading the report, the paragraph on page 7 which states "*According to data provided by PDM the above combination of operating conditions is consistent with a flow velocity of 24 m/sec through the cleaning slot. CFD predicted an average of 23.65 m/sec.*" was of significance to me.

14. The figure of 24 m/sec for the air flow velocity through the cleaning slot was a value previously measured on an actual apparatus using textured rollers. The close correlation between the actual figure of 24 m/sec for an apparatus using

actual textured rollers and the modelled figure of 23.65 m/sec on the basis of modelling smooth rollers made me realise that, contrary to my earlier expectations, the CFD analysis technique was of value in modelling the nature of the air flows and, moreover, that contrary to my earlier belief, the use of rough or textured rollers was not essential. Thus the close correlation of the real and modelled air flow velocities led me to the realisation that the web cleaning apparatus could be used successfully with smooth surfaced rollers, which provides significant advantages in terms of the cost of manufacture and the durability of the rollers in service.

15. Thus, I came to the realisation that the use of smooth rollers was possible and desirable on reading the feasibility study report on 5 March 2002.
16. I hereby declare that all statements made herein are of my own knowledge and are true and further that these statements were made with the knowledge that wilful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful statements may jeopardize the validity of the application or any patent issued thereon.

Les Bennett

6th June 2007
Date

Witnessed By:

Hilary JS Temple
(signature)

HILARY JS TEMPLE
(name)

06 . 06 . 07
Date

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ANNEX A

THE UNIVERSITY OF SHEFFIELD
DEPARTMENT OF MECHANICAL ENGINEERING

CFD Analysis Of The PDM Twin Turbo Web Cleaning System

Feasibility Study

4th March, 2002

Author: John.H.Hart

A Feasibility Study For: PδM LIMITED

27 Lyndale Road,
Bingley, West Yorkshire,
BD16 3HE England

PROJECT SUMMARY

The aim of this study was to determine the feasibility of the use of CFD in the simulation of the PDM Twin Turbo web cleaning system. Two dimensional simulations of the system have been conducted using the CFD solver Fluent Version 5.5. Two principle studies have been conducted, investigating the influence of $_1$.buff roller velocity (2900, 3600, & 4200 rpm) & $_2$.vacuum level (-25 to -250 mm H_2O).

Discrete phase modelling was incorporated within the studies to simulate and track the trajectories of paper dust particles within the system. Particles varying in size from 100 microns to 1 micron were tracked using a stochastic model. Information regarding the destination of these particles is provided, along with plots of their trajectories. Additional graphical output for each simulation is provided as outlined within the main deliverables.

Main Deliverables:

- Brief report covering details of the investigation and outcomes.
- CFD results for individual simulations including:
  - Velocity vectors.
  - Contour plots of: velocity, pressure, & turbulence intensity.
  - Stream function plots.
  - Particle tracking plots.

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CFD MODEL

Mathematical Model & Numerics

The mathematical model consists of the governing equations. These are the Navier-Stokes equations upon which all CFD is based. A standard k-ε turbulence model was used to provide turbulence closure of the Navier-Stokes equations. This also required the use of a standard wall function to model the boundary layers which form at surfaces.

The equations were solved using the Fluent V5.5 segregated flow solver. Additionally an ideal gas law was used to calculate density. All equations were solved with second order accuracy discretisation.

Modelled Geometry & Computational Mesh

Both the geometry and computational mesh for the Twin Turbo web cleaning system were generated within the mesh generation package Gambit V1.3.0. and imported into Fluent. A two dimensional geometrical assumption was adopted. Figure 2 shows the modelled geometry. The buff roller was modelled with a reduced external diameter creating a 1mm gap between the roller and paper web, representative of the gap created by pressure at the roller/paper nip. This also resulted in a slight gap between the roller and beater bar assembly.

The computational mesh for the modelled geometry is shown in Figure 3. This comprises 10597 quadrilateral cells.

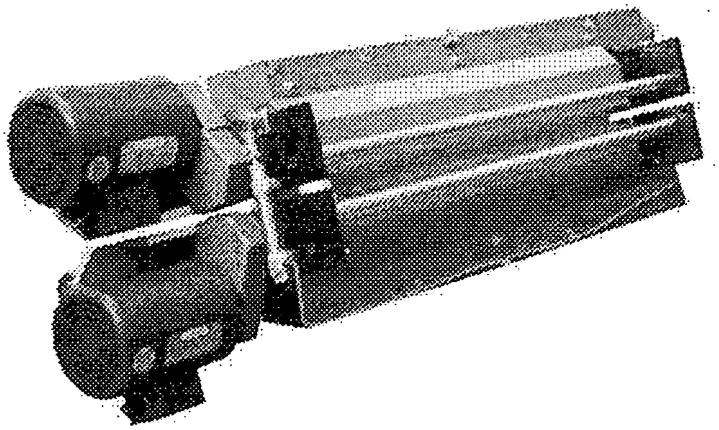

Figure 1 – A PDM Twin Turbo Web Cleaning System

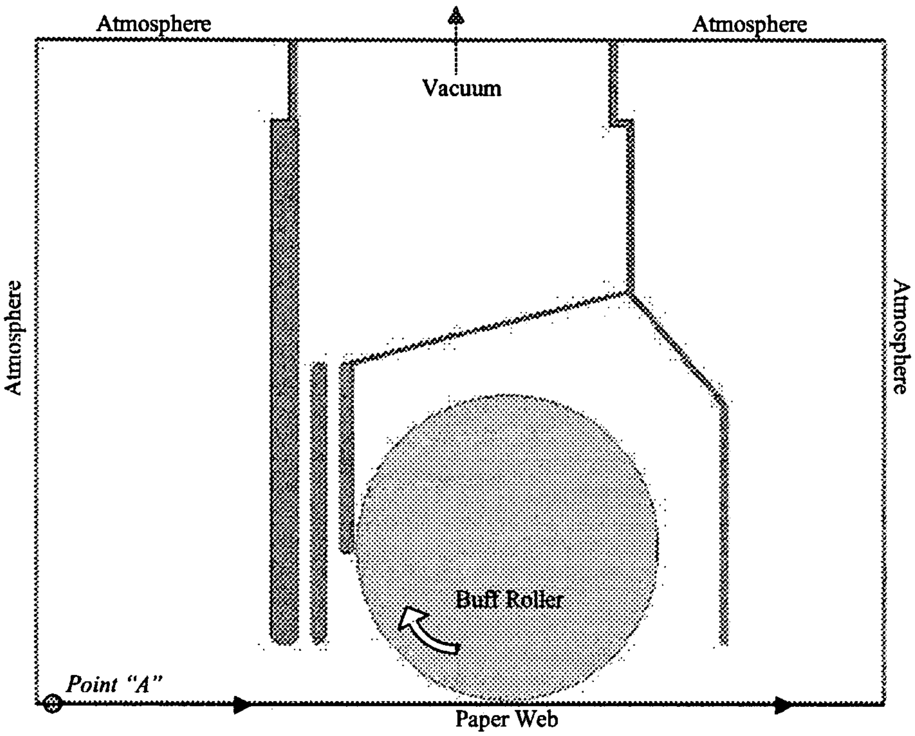

Figure 2 – Modelled Geometry

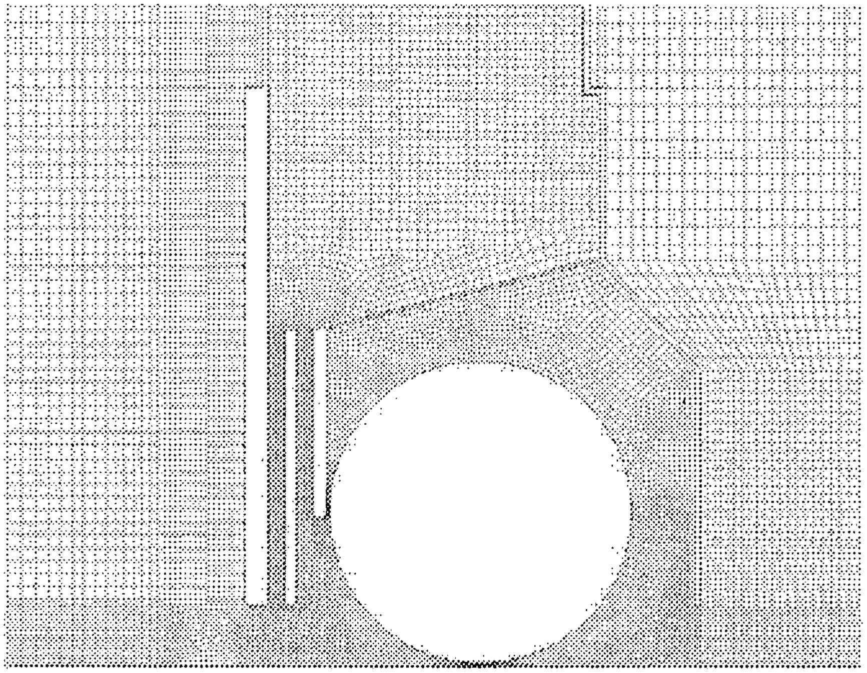

Figure 3 – Computational Mesh

Boundary Conditions

A combination of pressure boundaries were used to model flow boundaries. The atmospheric boundaries were specified with a pressure inlet condition. A pressure outlet boundary was used to model the vacuum source. Specified conditions at the flow boundaries are listed in Table 1.

	Total Pressure	Static Pressure	Temperature
Atmospheric	101325 Pa	101325 Pa	300 K
Vacuum	n/a	-25 to -250 mm H_2O	300 K

Table 1 – Specified Flow Boundary Conditions

All walls were specified with a heat flux condition and assumed adiabatic. Moving walls were specified for the buff roller and paper web. The paper web was fixed with a translational velocity of 13 m/sec. The buff roller velocity was set at either 2900, 3600, or 4200 rpm dependent upon the simulation being conducted.

Physical Properties

The working fluid is air. Physical properties were specified accordingly and are listed in Table 2. Fluid density was calculated using an ideal gas law. Although the fluid never attains velocities high enough to make compressibility an issue, the use of an ideal gas law is a requisite due to the use of pressure boundaries.

Density (kg/m^3)	Specific Heat (j/kgK)	Thermal Conductivity (W/mK)	Viscosity (kg/ms)	Mol wt. (kg/kgmol)
Ideal Gas	1006.43	0.0242	1.7894e-5	28.966

Table 2 – Physical Properties

Discrete Phase Modelling

Discrete phase modelling has been used to predict the trajectories of paper dust particles cleared by the Twin Turbo system. Specified physical properties of the paper dust particles are listed in Table 3.

Density (kg/m^3)	Specific Heat (j/kgK)	Thermal Conductivity (W/mK)
600	2310	0.1298

Table 3 - Physical Properties of Paper Dust

Particles of diameter 100μm, 10μm, & 1μm, have been tracked. All particles were released from point A (see Figure 1) at the surface of the paper web. Single particles of fixed diameter were released, and stochastic tracking used to predict 500 possible trajectories dependant upon the influence of turbulent velocity fluctuations. In total 10 particles of each diameter were released, resulting in the prediction of 5000 possible trajectories at each particle size. The results of the stochastic tracking were used to calculate the average destination of particles at each size. This is listed as either; $_1$.**caught** (cleaned by the Twin Turbo system), $_2$.**escaped** (escaped cleaner to atmosphere), or $_3$.**incomplete** (trapped in cleaner).

RESULTS

The following section contains the results of the individual simulations conducted in this feasibility study. All graphical output can be found in Appendix 1.

Initial Study

The initial study was used to determine the stability, and the suitability of the chosen numerics, and generated computational mesh for the simulation of the Twin Turbo system. The device operating conditions applied in the simulation are listed in Table 4. The average final destination of tracked particle trajectories is listed in Table 5.

ID	Vacuum (mm H_2O)	Roller Velocity (rpm)
PDM-001	-50	3600

Table 4 – Operating Conditions

ID	Average Particle Destination (%)								
	Caught			Escaped			Incomplete		
	100μm	10μm	1μm	100μm	10μm	1μm	100μm	10μm	1μm
PDM-001	73.48	73.98	91.62	21.98	26.02	8.16	4.54	0	0.22

Table 5 – Particle Destination

According to data provided by PDM the above combination of operating conditions is consistent with a flow velocity of 24 m/sec through the cleaning slot. CFD predicted an average of 23.65 m/sec.

Areas of recirculating flow within the device can be clearly seen within Figure A-1, showing contours of stream function, and Figure A-3, showing velocity vectors.

Particle traces, Figures A-7 to A-9 show the majority of the released dust particles to be cleared by the cleaning slots. It can be seen how a number of particles become trapped in the roller chamber. However it is interesting to see that according to the particle destination reports only the 100µm particles appear to become trapped, the 10µm particles eventually escaping or being caught. It can be seen that the 100µm particles predominantly travel up the back wall of the cleaning slot which could eventually lead to a build up in debris upon this surface

Buff Roller Velocity Study

A study of the influence of buff roller velocity has been conducted. Specified device operating conditions are listed in Table 6. The average final destination of tracked particles is listed in Table 7, and results are shown graphically overleaf in Figure 4.

ID	Vacuum (mm H_2O)	Roller Velocity (rpm)
PDM-002	-50	2900
PDM-001	-50	3600
PDM-003	-50	4200

Table 6 – Operating Conditions

ID	Average Particle Destination (%)								
	Caught			Escaped			Incomplete		
	100µm	10µm	1µm	100µm	10µm	1µm	100µm	10µm	1µm
PDM-002	67.64	70.64	88.12	28.38	29.32	9.96	3.98	0.04	0.28
PDM-001	73.48	73.98	91.62	21.98	26.02	8.16	4.54	0	0.22
PDM-003	75.56	70.02	92.14	19.38	22.38	7.50	5.06	0.02	0.36

Table 7 – Particle Destination

It can be seen from Figure 3 that the predicted performance of the Twin Turbo system improves with increased roller velocity. As the velocity is increased fewer particles are observed to escape under the buff roller.

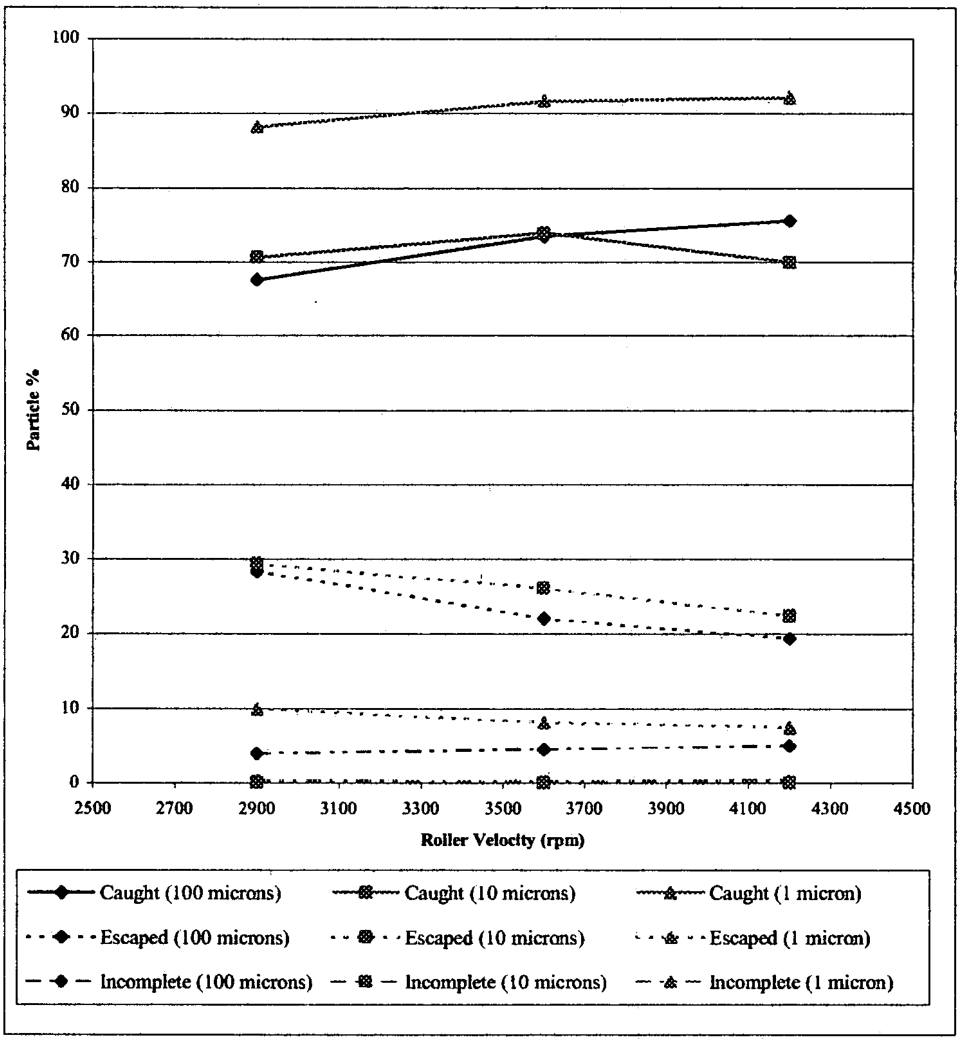

Figure 4 – Buff Roller Velocity Study Particle Destination

Vacuum Study

A study of the influence of vacuum level has been conducted. Specified device operating conditions are listed in Table 8. The average final destination of tracked particles is listed in Table 9, and results are shown graphically overleaf in Figure 5.

ID	Vacuum (mm H_2O)	Roller Velocity (rpm)
PDM-004	-25	3600
PDM-001	-50	3600
PDM-005	-75	3600
PDM-006	-100	3600
PDM-007	-250	3600

Table 8 – Operating Conditions

ID	Average Particle Destination (%)								
	Caught			Escaped			Incomplete		
	100μm	10μm	1μm	100μm	10μm	1μm	100μm	10μm	1μm
PDM-004	53.96	70.54	89.80	35.32	29.42	9.90	4.72	0.04	0.30
PDM-001	73.48	73.98	91.62	21.98	26.02	8.16	4.54	0	0.22
PDM-005	78.30	75.32	92.48	17.30	24.64	6.90	4.40	0.04	0.62
PDM-006	79.08	74.60	92.28	16.92	25.40	7.14	4.00	0	0.58
PDM-007	81.46	78.30	96.94	12.92	10.16	0.62	5.62	11.54	2.44

Table 9 – Particle Destination

It can be seen that increasing the level of vacuum leads to an improvement in the number of dust particles caught by the Twin Turbo system. However it can also be seen that no real benefits are obtained for an increase in vacuum above 100 mm H_2O. Particularly noticeable is the improvement in entrapment of particles in the 100μm range for an increase in vacuum levels. Although improvements are observed for the removal of particles below this size they are not as marked.

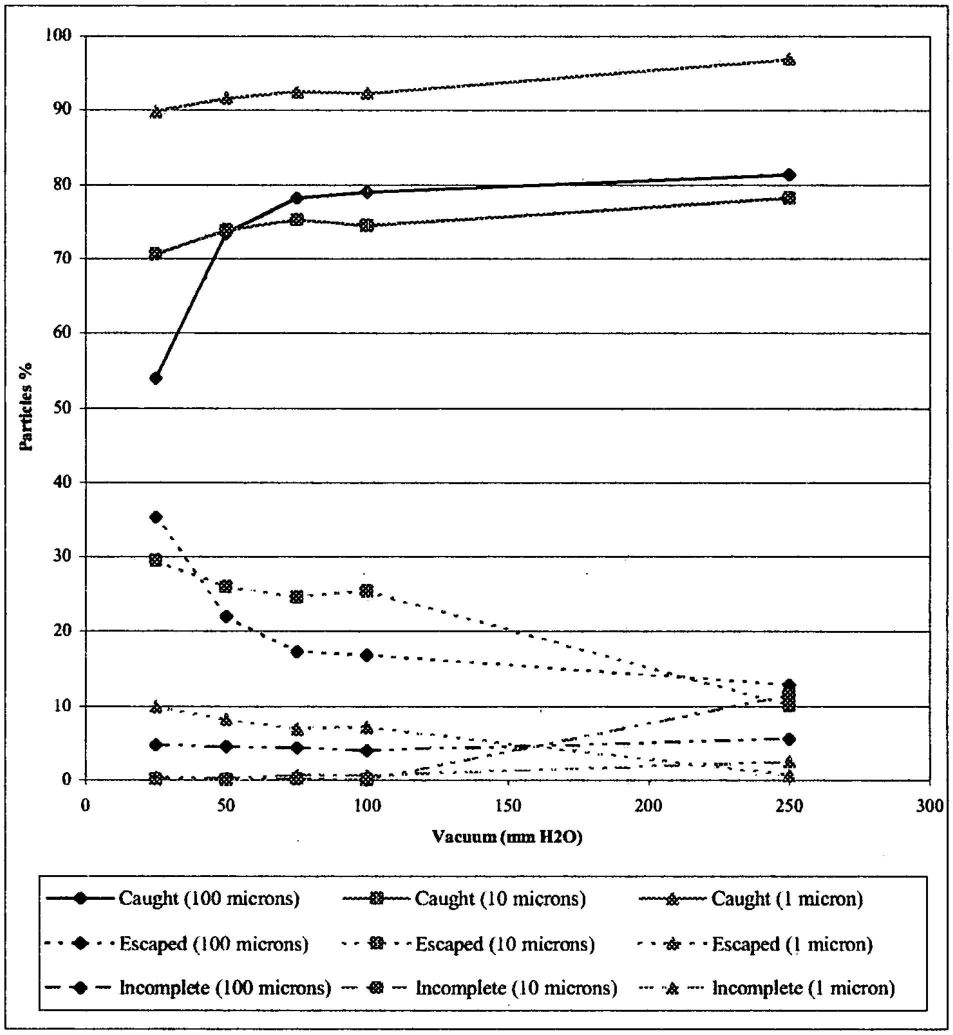

Figure 5 – Vacuum Level Study Particle Destination

CONCLUSIONS

The PDM Twin Turbo system has been simulated using CFD. Individual trajectories of dust paper particles 100µm-1µm have been predicted. Studies showing the influence of buff roller velocity and vacuum level have been conducted. The following can be noted.

- Predicted fluid velocity through the cleaning slots is comparable with that stated by PDM.
- Regions of recirculating flow within the Twin Turbo system are clearly visible from plots of stream function and velocity vectors.
- Increasing buff roller velocity was shown to lead to a moderate increase in particle entrapment.
- Increasing vacuum levels, leads to an improvement in particle entrapment. Marked improvement in the entrapment of 100µm particles is noted.

APPENDIX 1

A - Graphical Output PDM-001

Images & Corresponding File Name

Figure A-1 – Contours of stream function:	pdm-001-stream_function.*
Figure A-2 – Contours of velocity magnitude:	pdm-001-velocity_magnitude.*
Figure A-3 – Velocity vectors:	pdm-001-velocity_vectors.*
Figure A-4 – Contours of turbulence intensity:	pdm-001-turbulence_intensity.*
Figure A-5 – Contours of static pressure:	pdm-001-static_pressure.*
Figure A-6 – Contours of total pressure:	pdm-001-total_pressure.*
Figure A-7 – Particle traces: 100 microns:	pdm-001-particles_100_microns.*
Figure A-8 – Particle traces: 10 microns:	pdm-001-particles_10_microns.*
Figure A-9 – Particle traces: 1 micron:	pdm-001-particles_1_micron.*

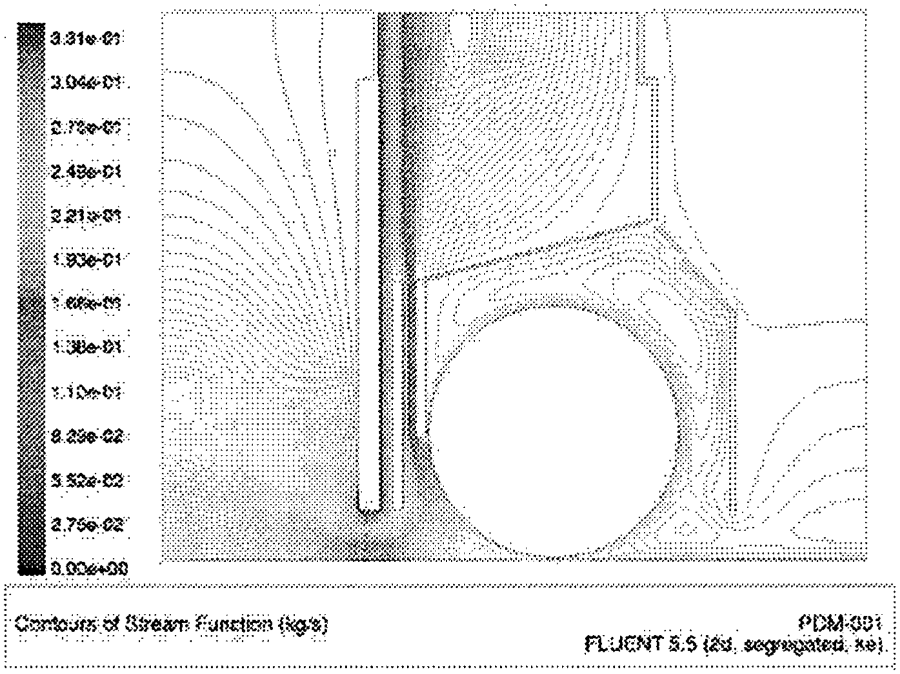

Figure A-1 – Contours of Stream Function

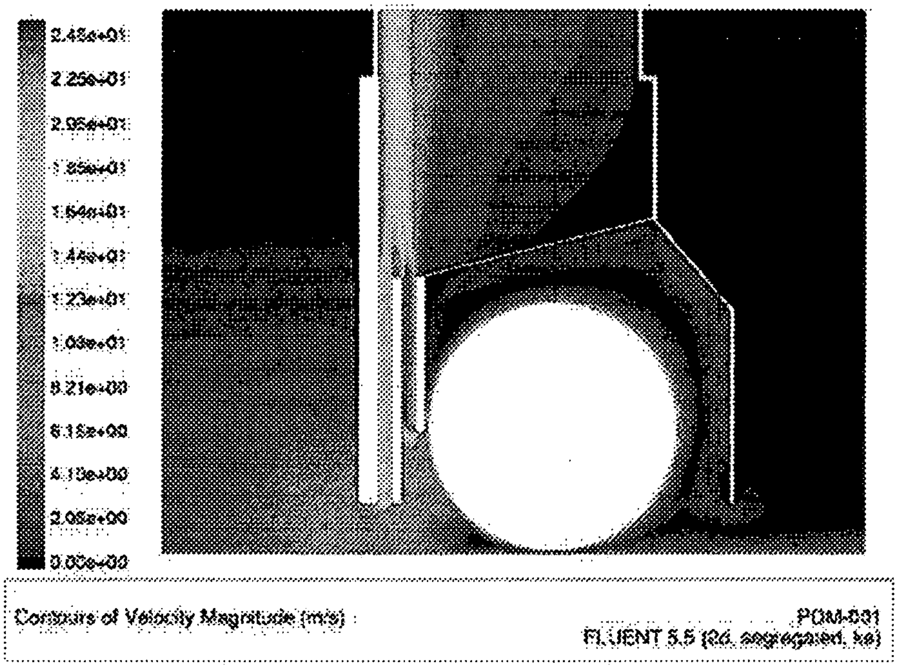

Figure A-2 – Contours of Velocity Magnitude

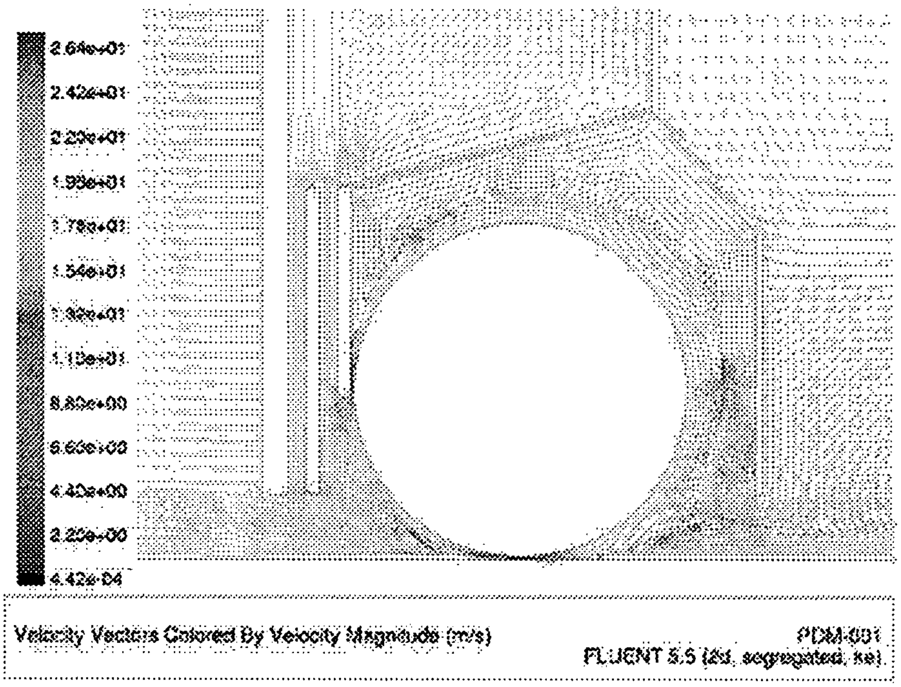

Figure A-3 – Velocity Vectors

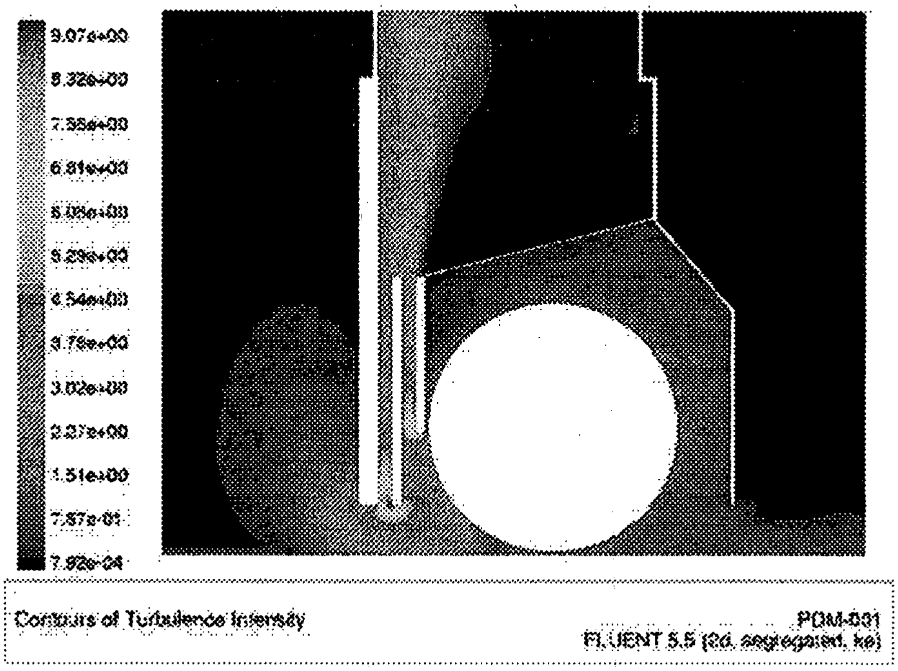

Figure A-4 – Contours of Turbulence Intensity

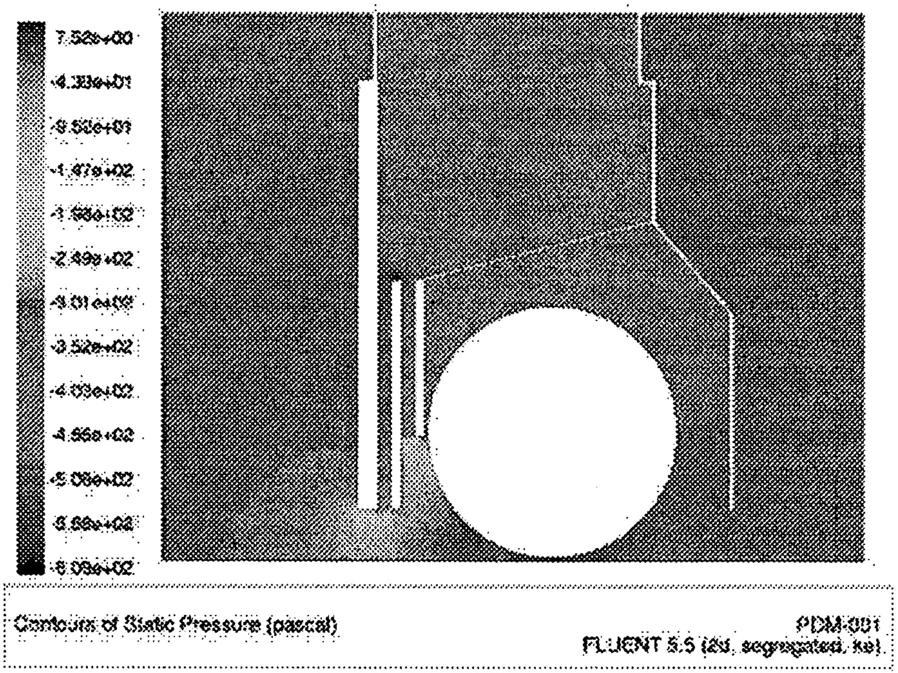

Figure A-5 – Contours of Static Pressure

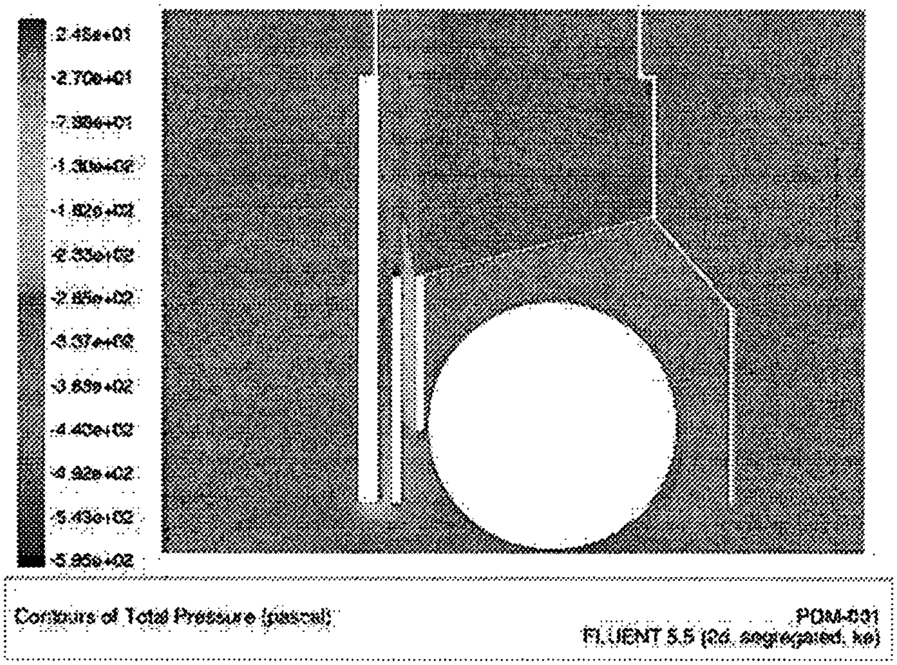

Figure A-6 – Contours of Total Pressure

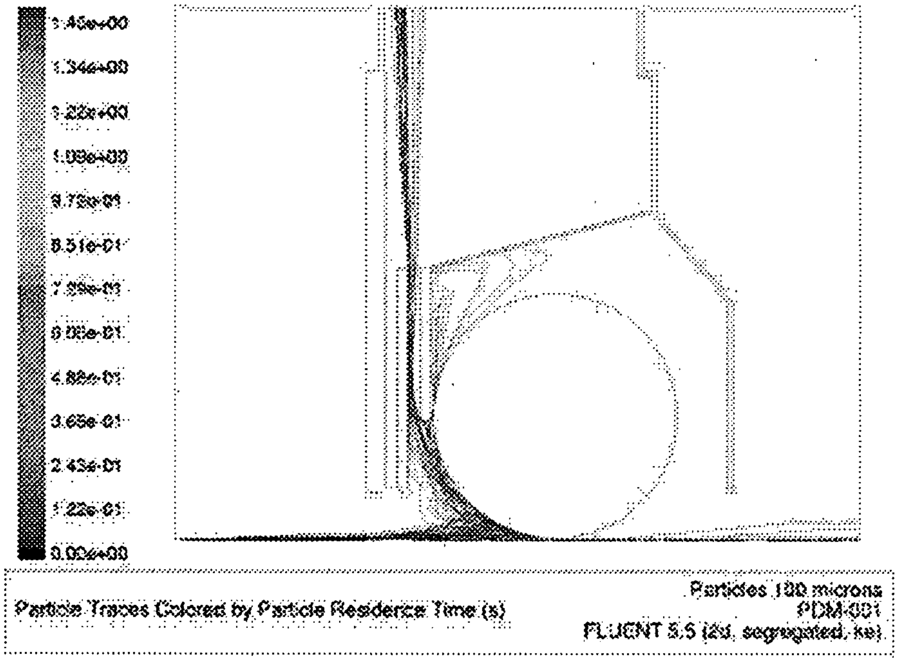

Figure A-7 – Particle Traces: 100 microns.

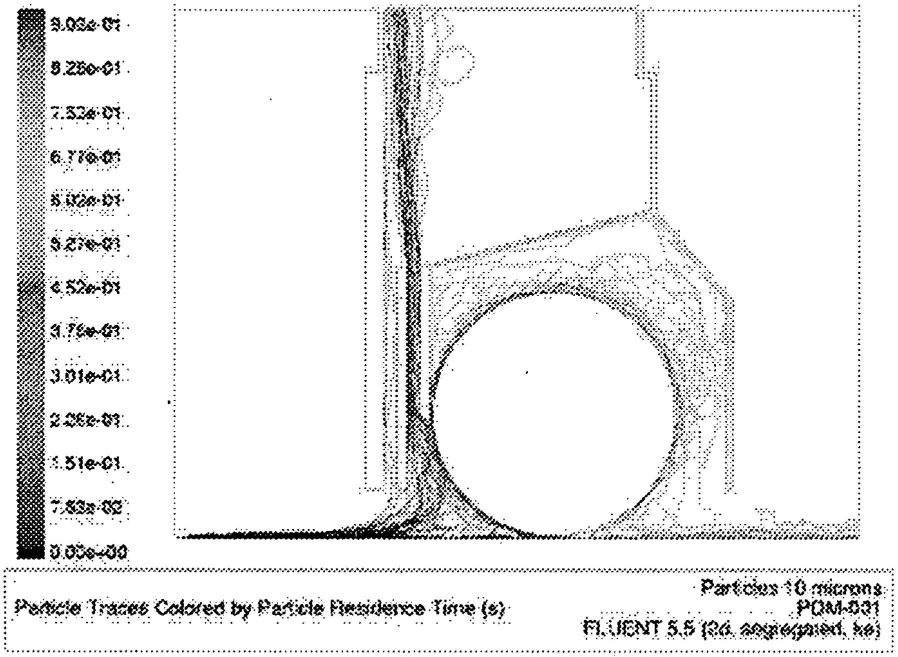

Figure A-8 – Particle Traces: 10 microns

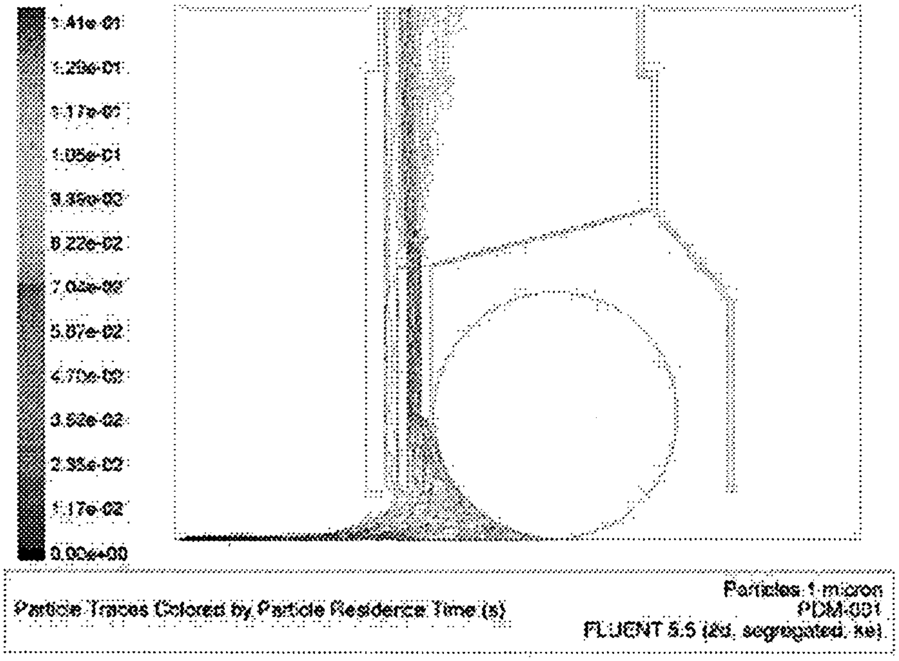

Figure A-9 – Particle Traces: 1 micron

B - Graphical Output PDM-002

Images & Corresponding File Name

- Figure B-1 – Contours of stream function: pdm-002-stream_function.*
- Figure B-2 – Contours of velocity magnitude: pdm-002-velocity_magnitude.*
- Figure B-3 – Velocity vectors: pdm-002-velocity_vectors.*
- Figure B-4 – Contours of turbulence intensity: pdm-002-turbulence_intensity.*
- Figure B-5 – Contours of static pressure: pdm-002-static_pressure.*
- Figure B-6 – Contours of total pressure: pdm-002-total_pressure.*
- Figure B-7 – Particle traces: 100 microns: pdm-002-particles_100_microns.*
- Figure B-8 – Particle traces: 10 microns: pdm-002-particles_10_microns.*
- Figure B-9 – Particle traces: 1 micron: pdm-002-particles_1_micron.*

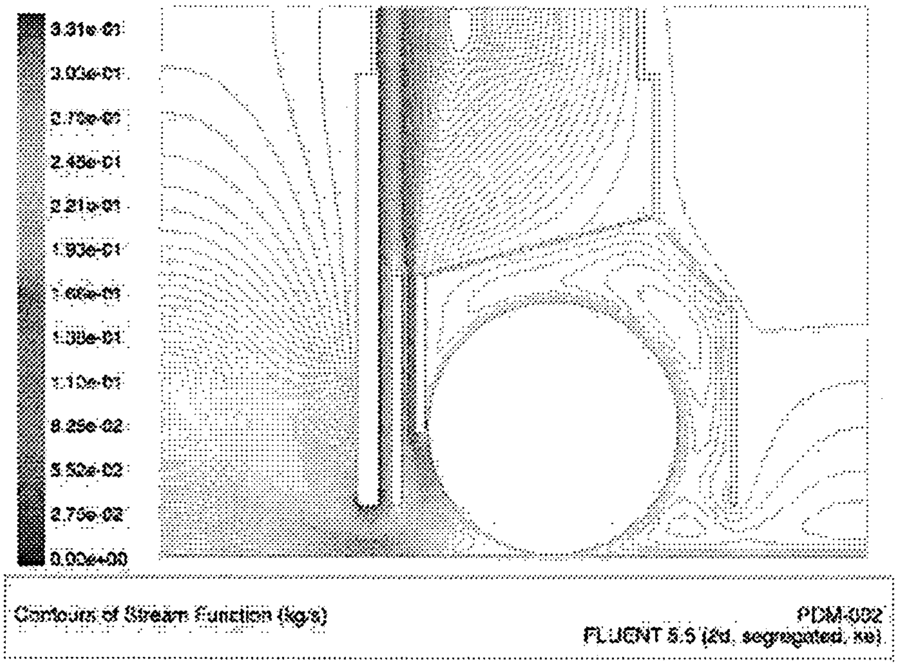

Figure B-1 – Contours of Stream Function

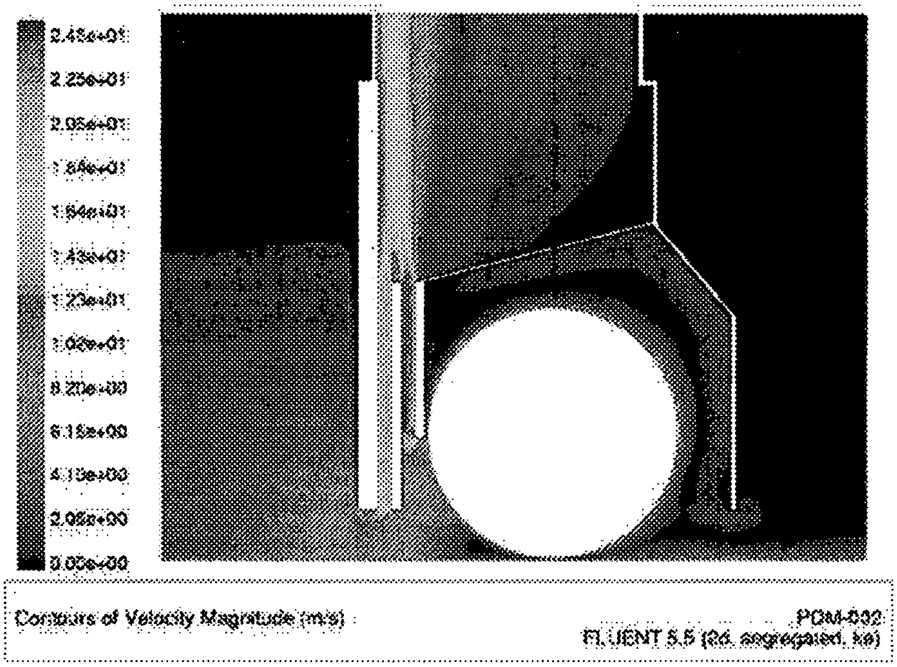

Figure B-2 – Contours of Velocity Magnitude

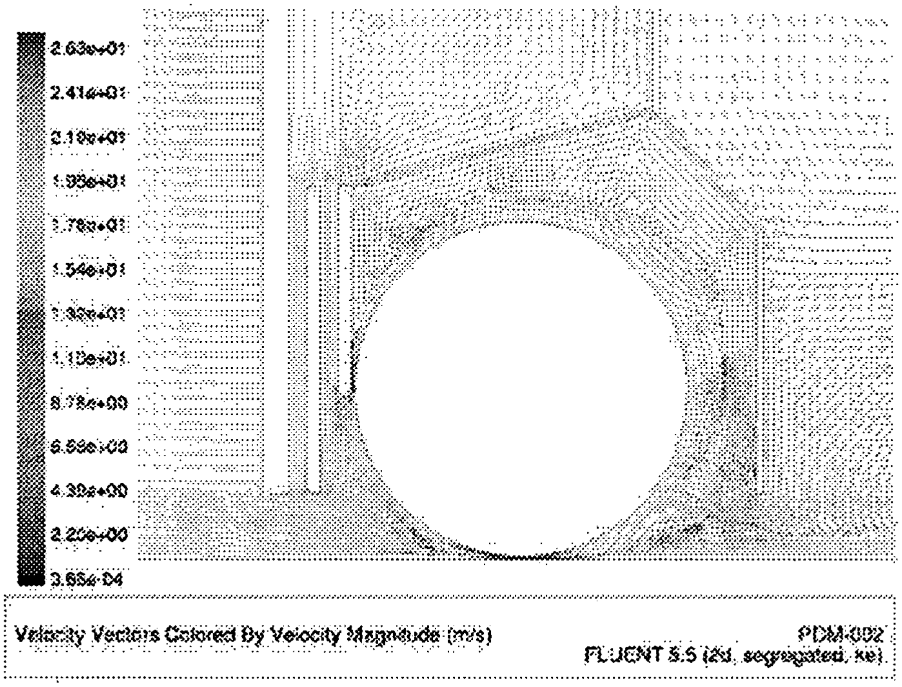

Figure B-3 – Velocity Vectors

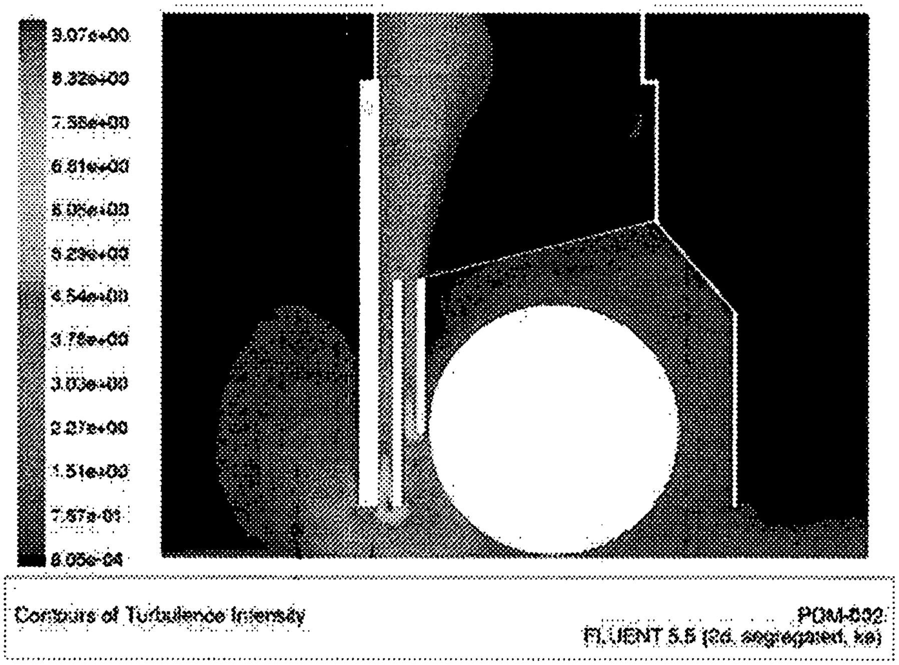

Figure B-4 – Contours of Turbulence Intensity

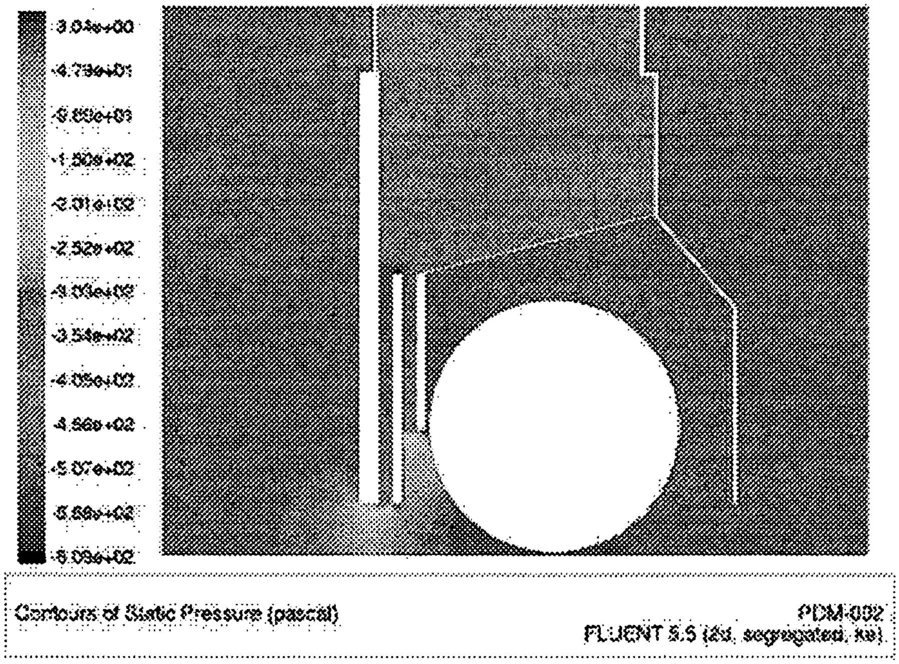

Figure B-5 – Contours of Static Pressure

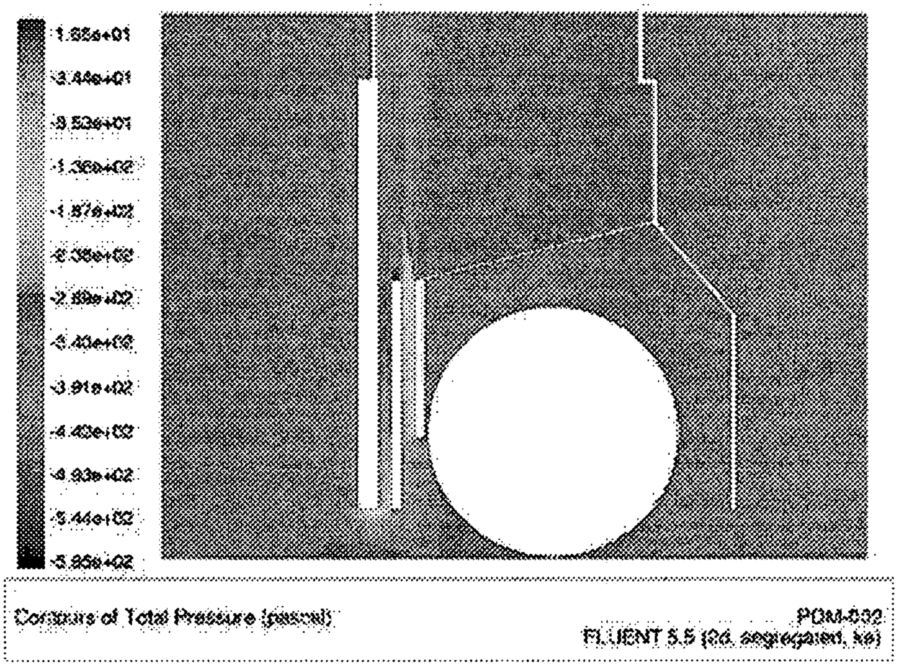

Figure B-6 – Contours of Total Pressure

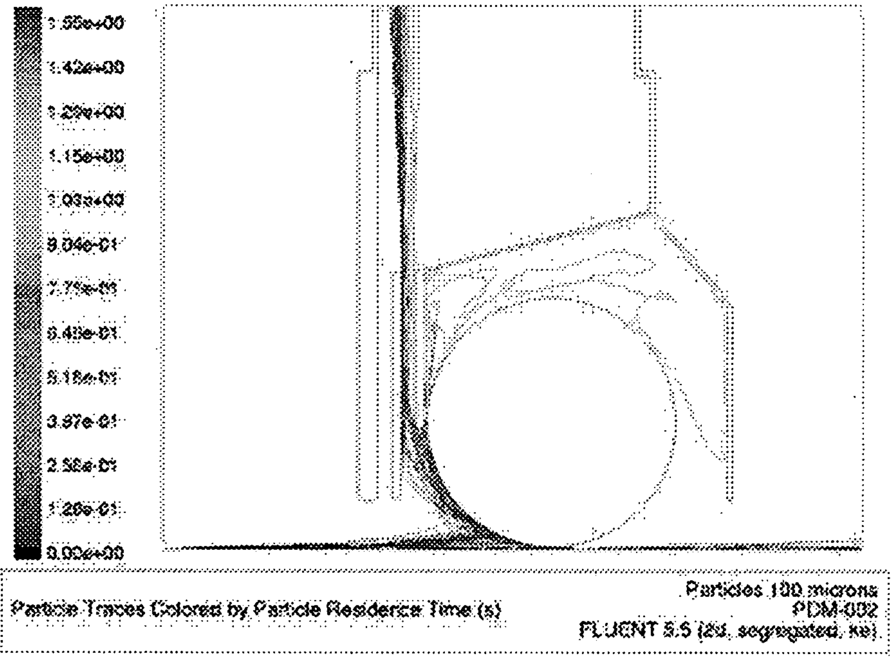

Figure B-7 – Particle Traces: 100 microns

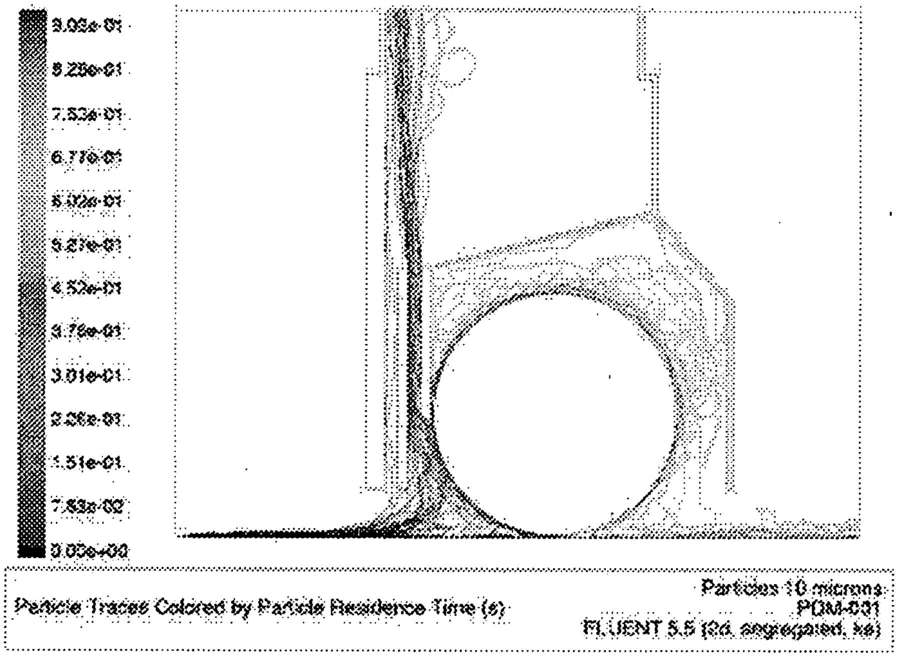

Figure B-*8 – Particle Traces: 10 microns*

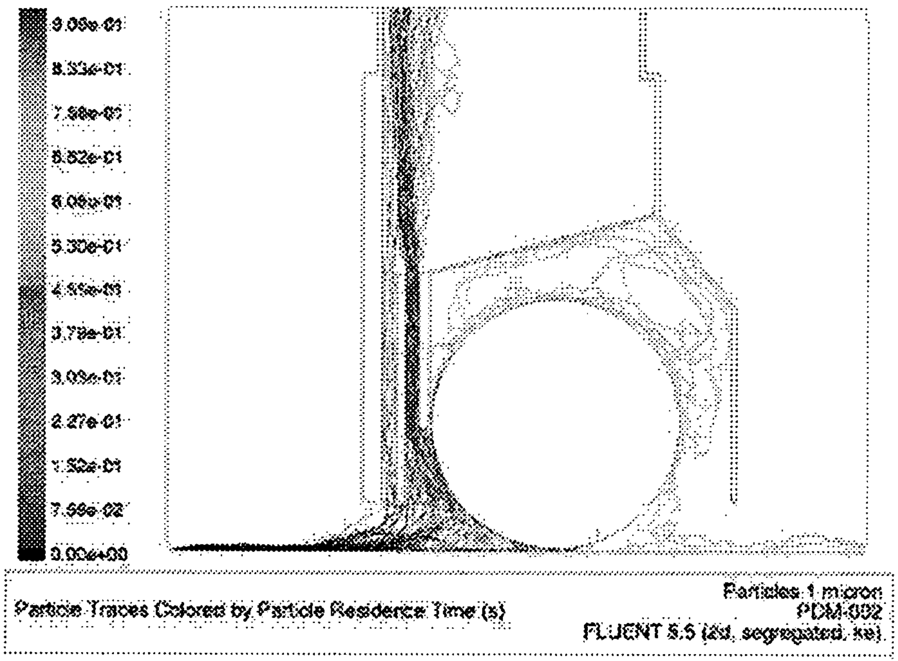

Figure B-*9 – Particle Traces: 1 micron*

C - Graphical Output PDM-003

Images & Corresponding File Name

- Figure C-1 – Contours of stream function: pdm-003-stream_function.*
- Figure C-2 – Contours of velocity magnitude: pdm-003-velocity_magnitude.*
- Figure C-3 – Velocity vectors: pdm-003-velocity_vectors.*
- Figure C-4 – Contours of turbulence intensity: pdm-003-turbulence_intensity.*
- Figure C-5 – Contours of static pressure: pdm-003-static_pressure.*
- Figure C-6 – Contours of total pressure: pdm-003-total_pressure.*
- Figure C-7 – Particle traces: 100 microns: pdm-003-particles_100_microns.*
- Figure C-8 – Particle traces: 10 microns: pdm-003-particles_10_microns.*
- Figure C-9 – Particle traces: 1 micron: pdm-003-particles_1_micron.*

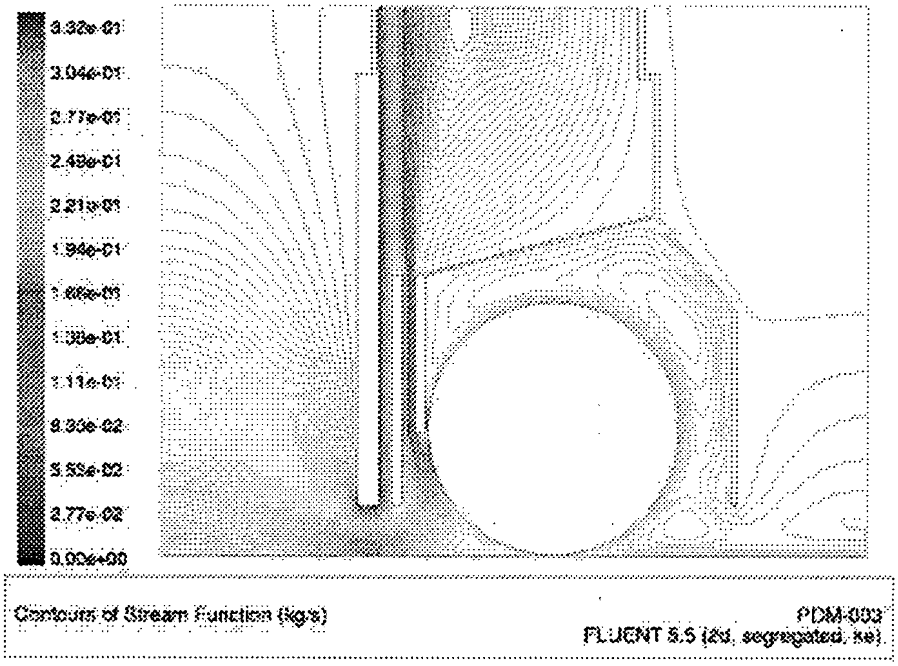

Figure C-1 – Contours of Stream Function

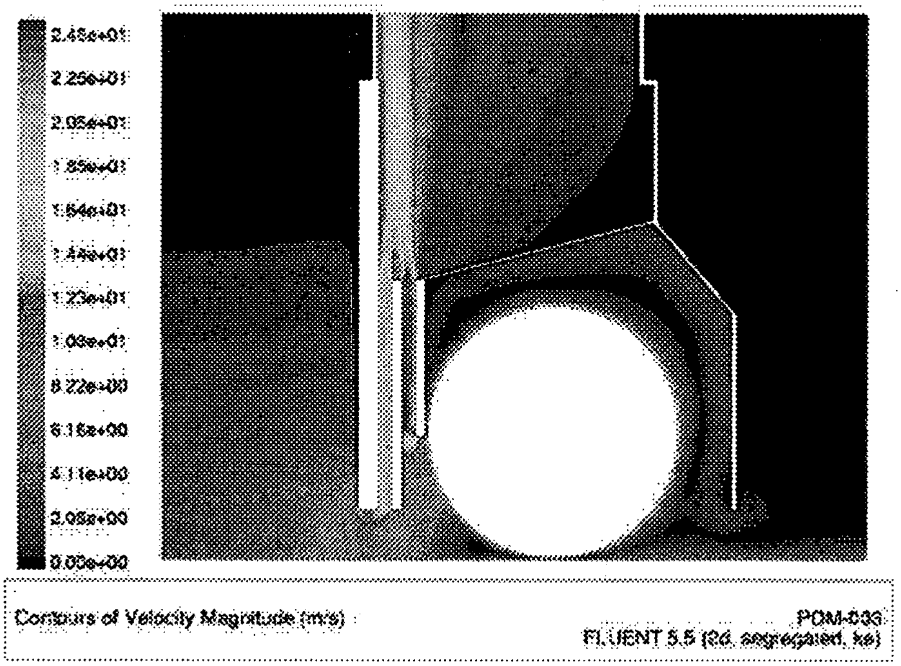

Figure C-2 – Contours of Velocity Magnitude

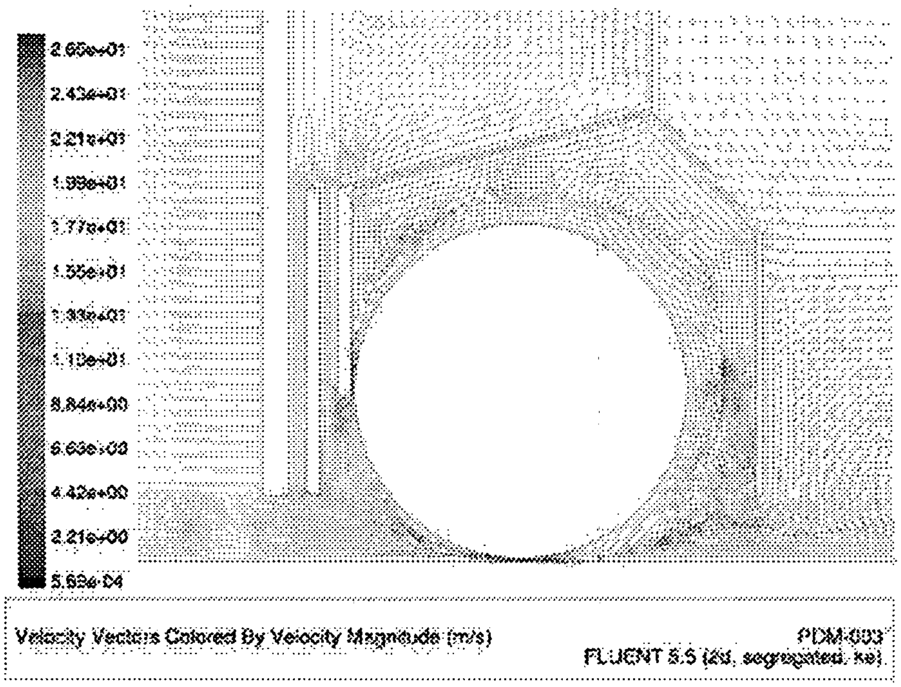

Figure C-3 – Velocity Vectors

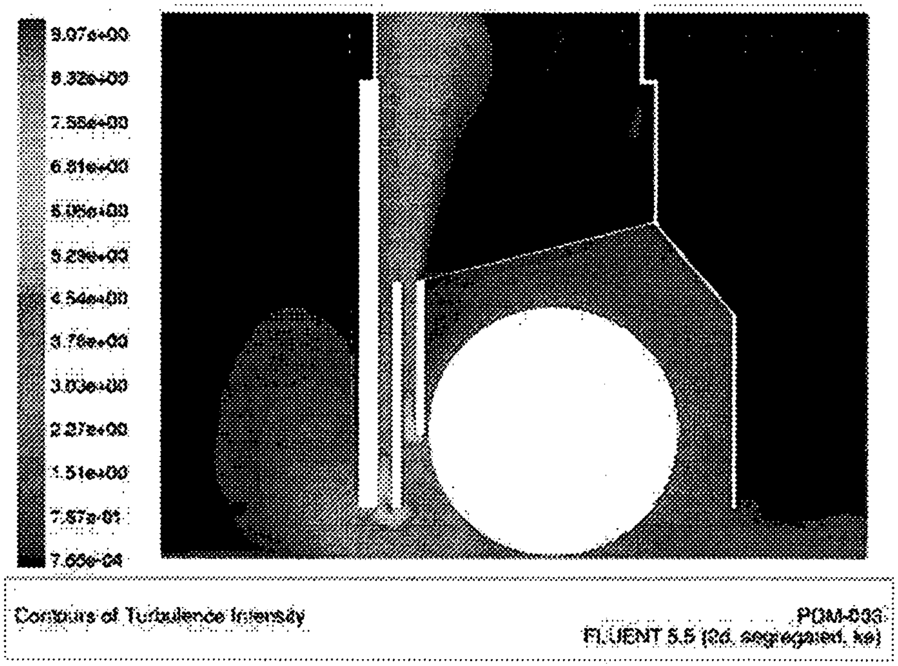

Figure C-4 – Contours of Turbulence Intensity

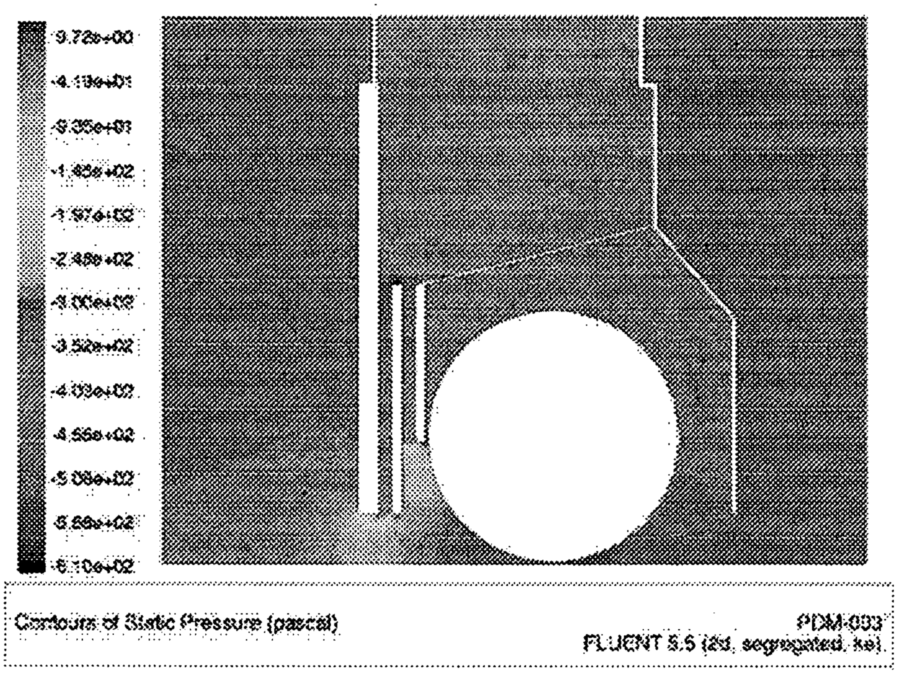

Figure C-5 – Contours of Static Pressure

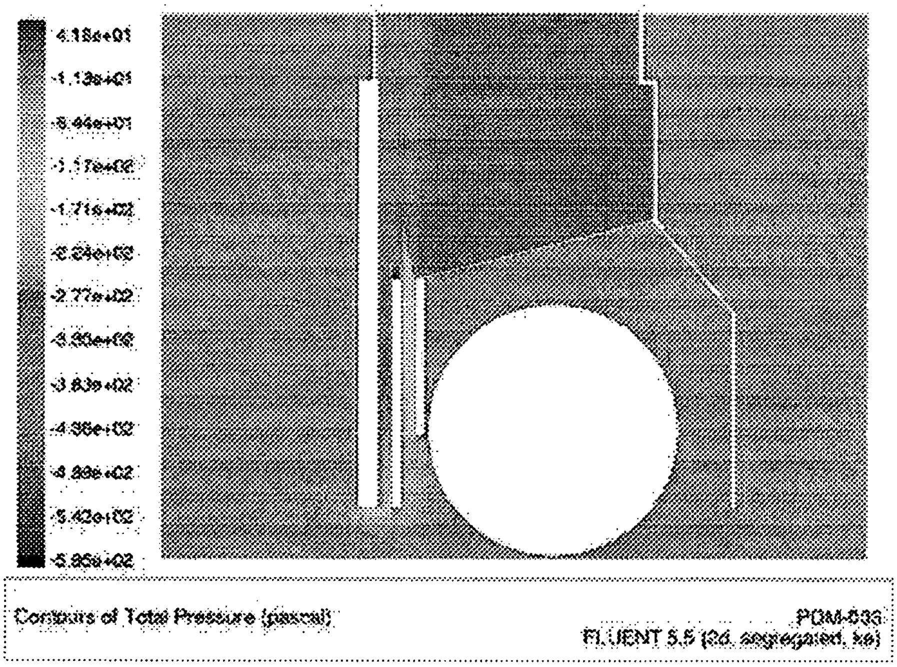

Figure C-6 – Contours of Total Pressure

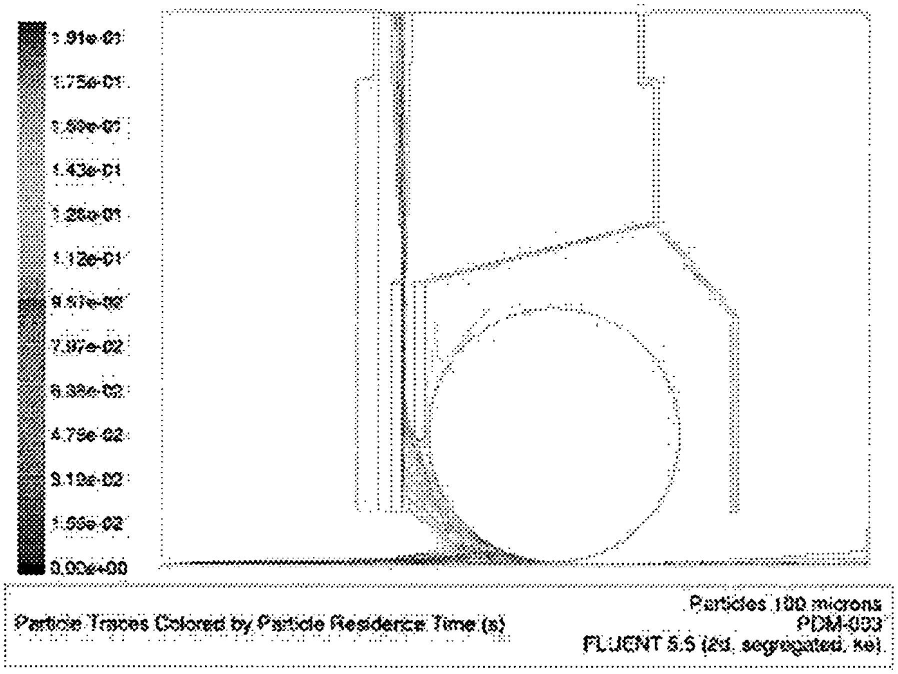

Figure C-7 – Particle Traces: 100 microns

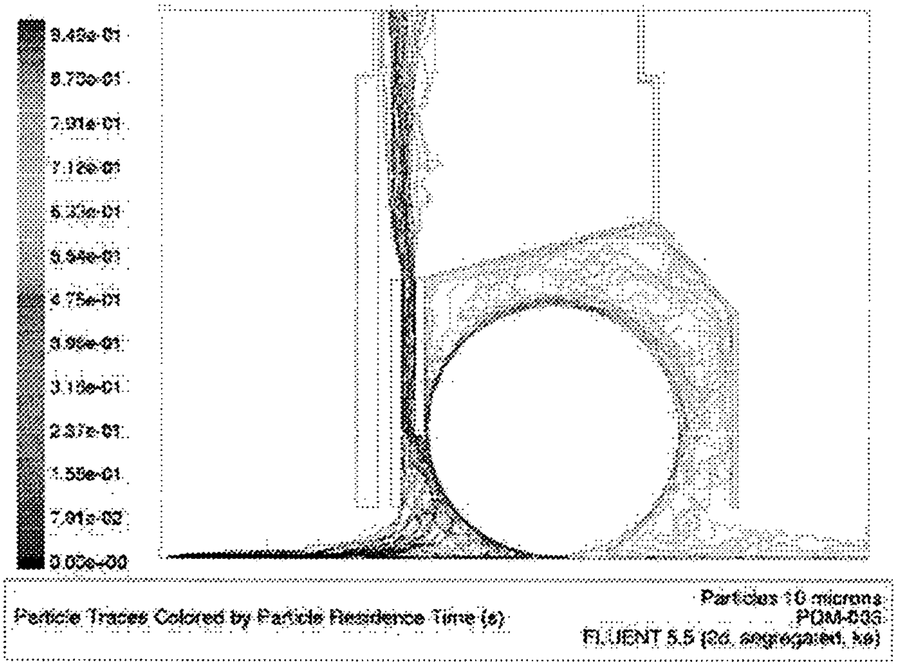

Figure C-8 – Particle Traces: 10 microns

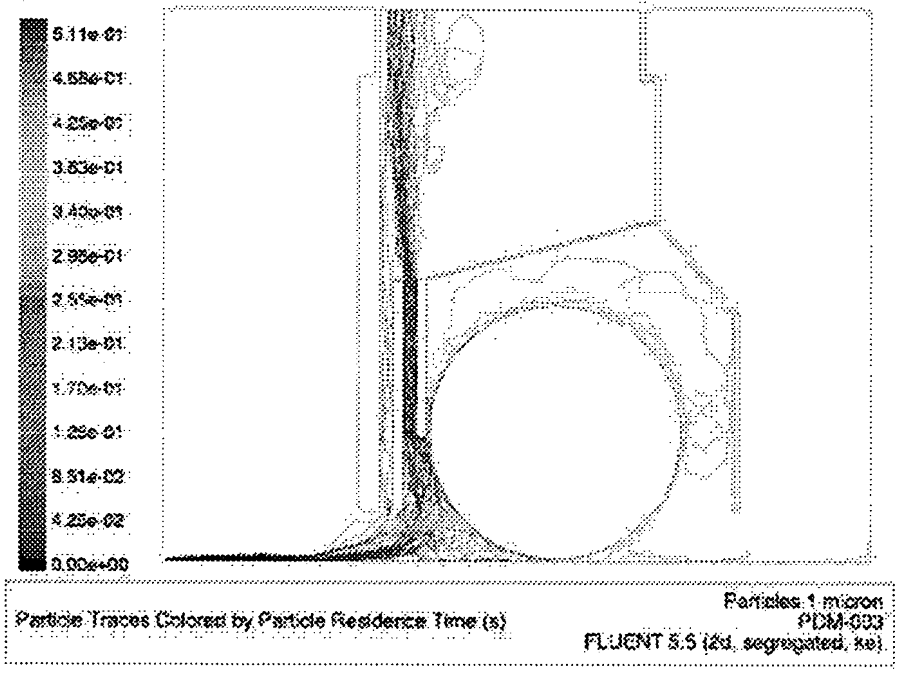

Figure C-9 – Particle Traces: 1 micron

D - Graphical Output PDM-004

Images & Corresponding File Name

- Figure D-1 – Contours of stream function: pdm-004-stream_function.*
- Figure D-2 – Contours of velocity magnitude: pdm-004-velocity_magnitude.*
- Figure D-3 – Velocity vectors: pdm-004-velocity_vectors.*
- Figure D-4 – Contours of turbulence intensity: pdm-004-turbulence_intensity.*
- Figure D-5 – Contours of static pressure: pdm-004-static_pressure.*
- Figure D-6 – Contours of total pressure: pdm-004-total_pressure.*
- Figure D-7 – Particle traces: 100 microns: pdm-004-particles_100_microns.*
- Figure D-8 – Particle traces: 10 microns: pdm-004-particles_10_microns.*
- Figure D-9 – Particle traces: 1 micron: pdm-004-particles_1_micron.*

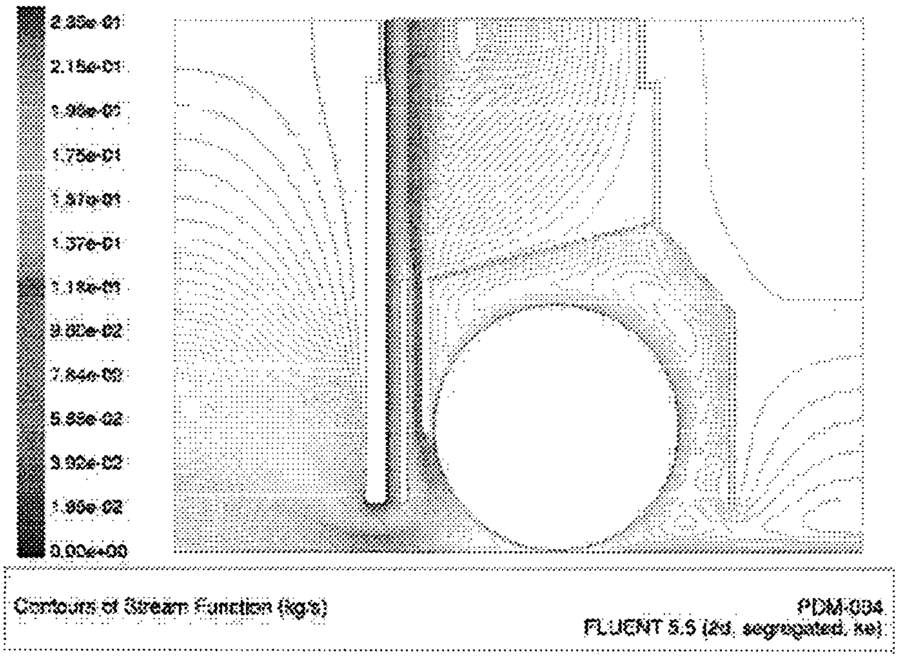

Figure D-1 – Contours of Stream Function

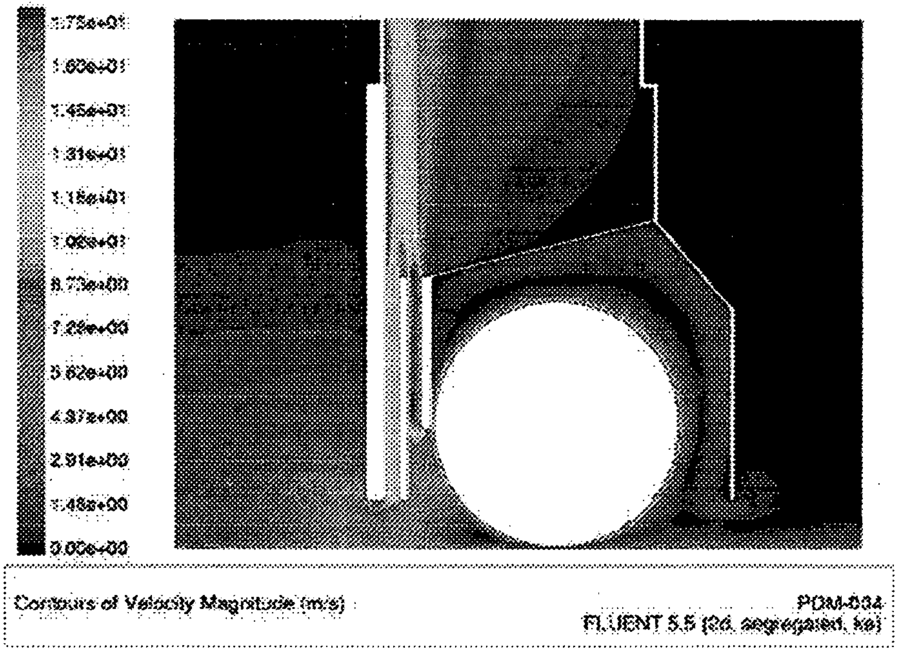

Figure D-2 – Contours of Velocity Magnitude

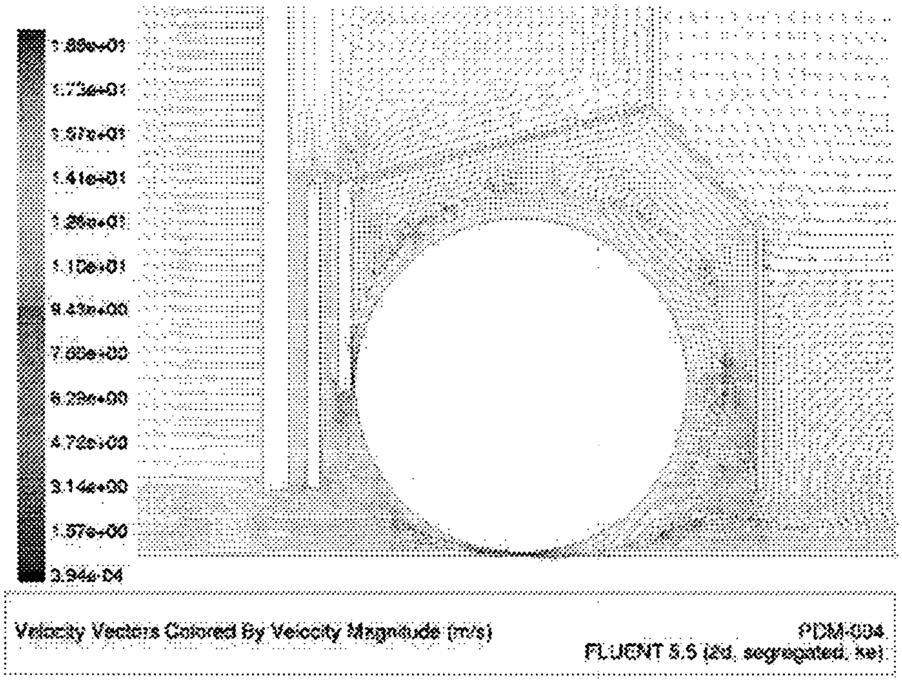

Figure D-3 – Velocity Vectors

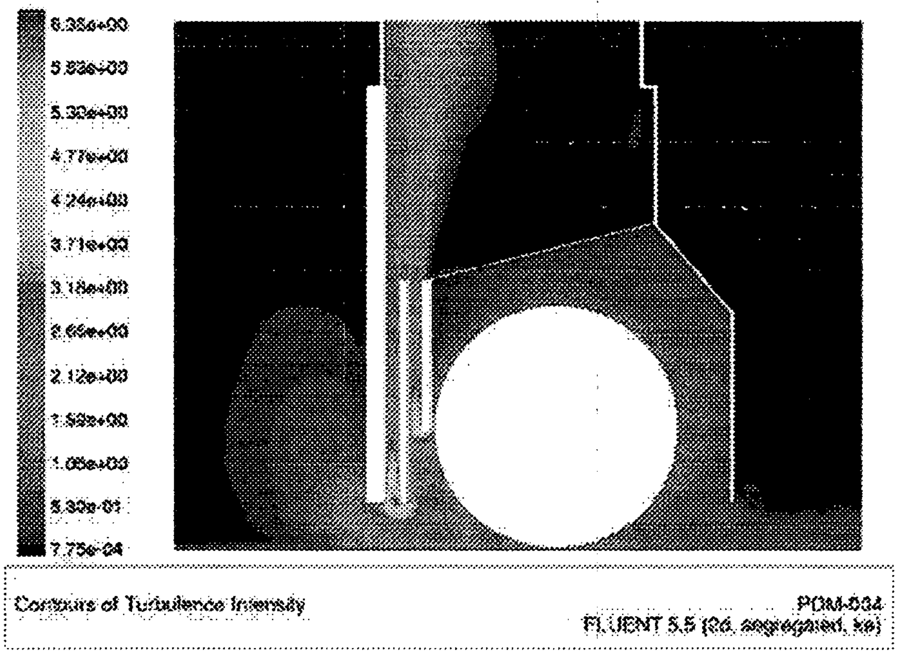

Figure D-4 – Contours of Turbulence Intensity

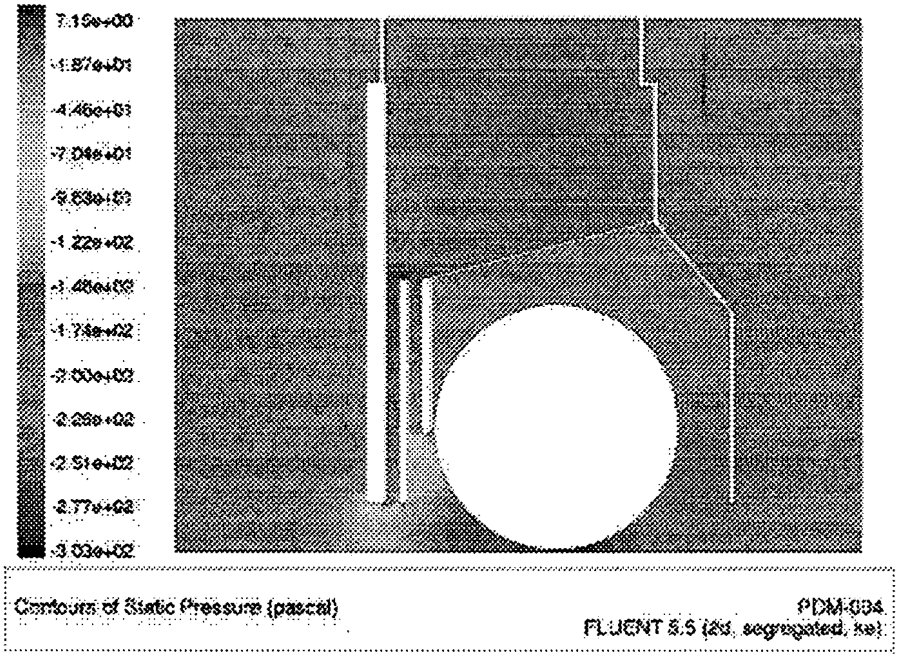

Figure D-5 – Contours of Static Pressure

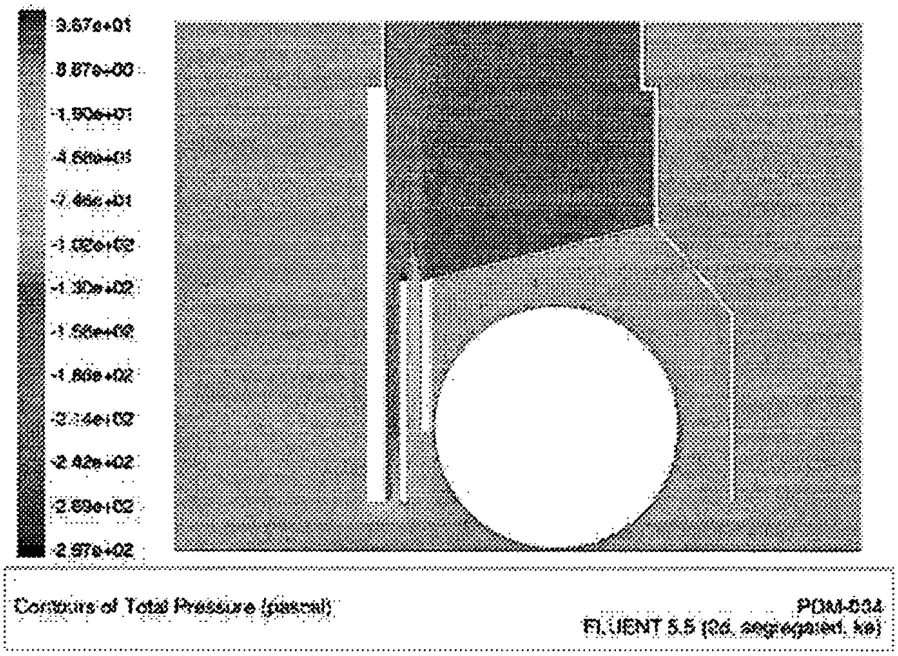

Figure D-6 – Contours of Total Pressure

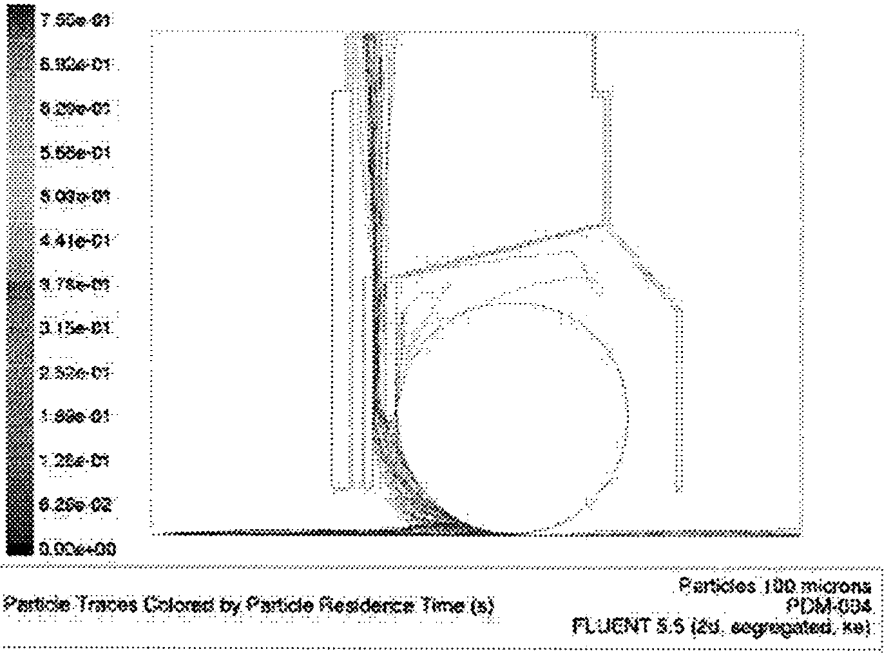

Figure D-7 – Particle Traces: 100 microns

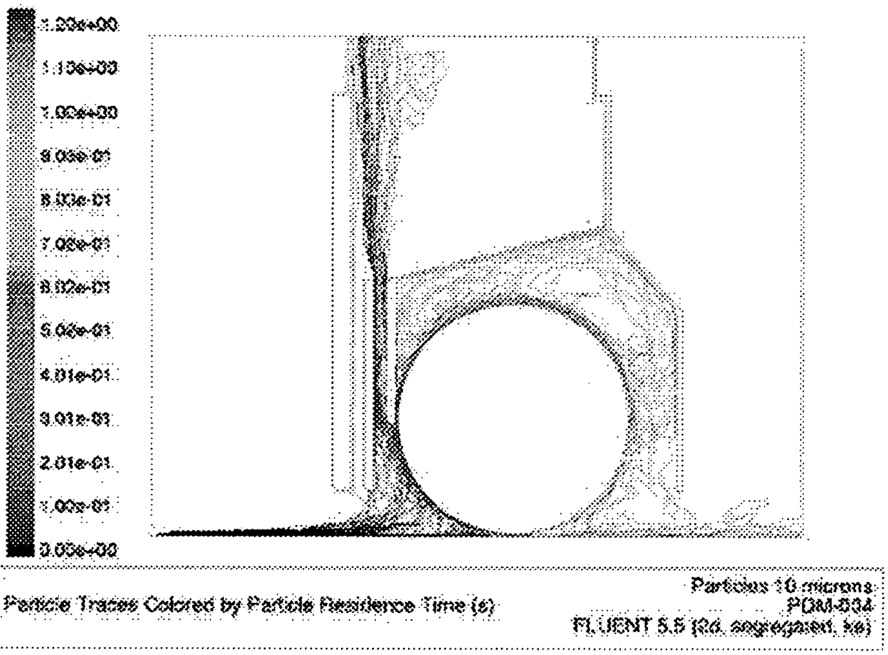

Figure D-8 – Particle Traces: 10 microns

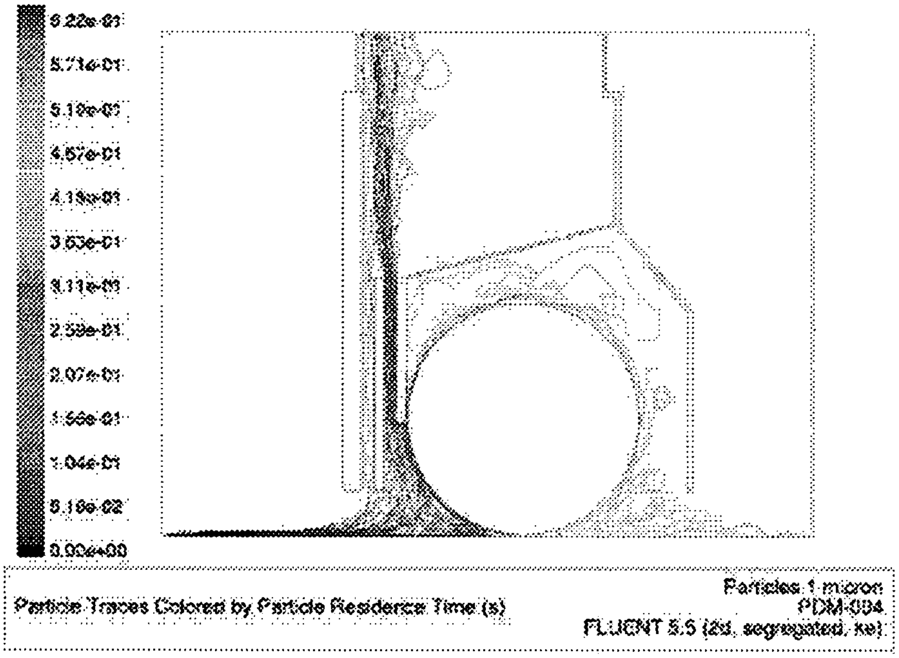

Figure D-9 – Particle Traces: 1 micron

E - Graphical Output PDM-005

Images & Corresponding File Name

Figure E-1 – Contours of stream function:	pdm-005-stream_function.*
Figure E-2 – Contours of velocity magnitude:	pdm-005-velocity_magnitude.*
Figure E-3 – Velocity vectors:	pdm-005-velocity_vectors.*
Figure E-4 – Contours of turbulence intensity:	pdm-005-turbulence_intensity.*
Figure E-5 – Contours of static pressure:	pdm-005-static_pressure.*
Figure E-6 – Contours of total pressure:	pdm-005-total_pressure.*
Figure E-7 – Particle traces: 100 microns:	pdm-005-particles_100_microns.*
Figure E-8 – Particle traces: 10 microns:	pdm-005-particles_10_microns.*
Figure E-9 – Particle traces: 1 micron:	pdm-005-particles_1_micron.*

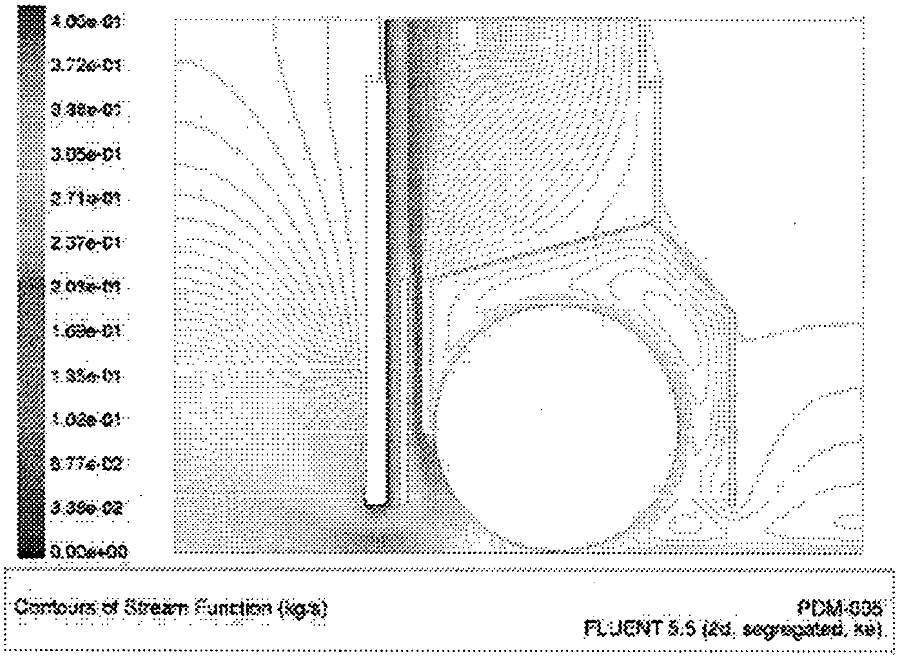

Figure E-1 – Contours of Stream Function

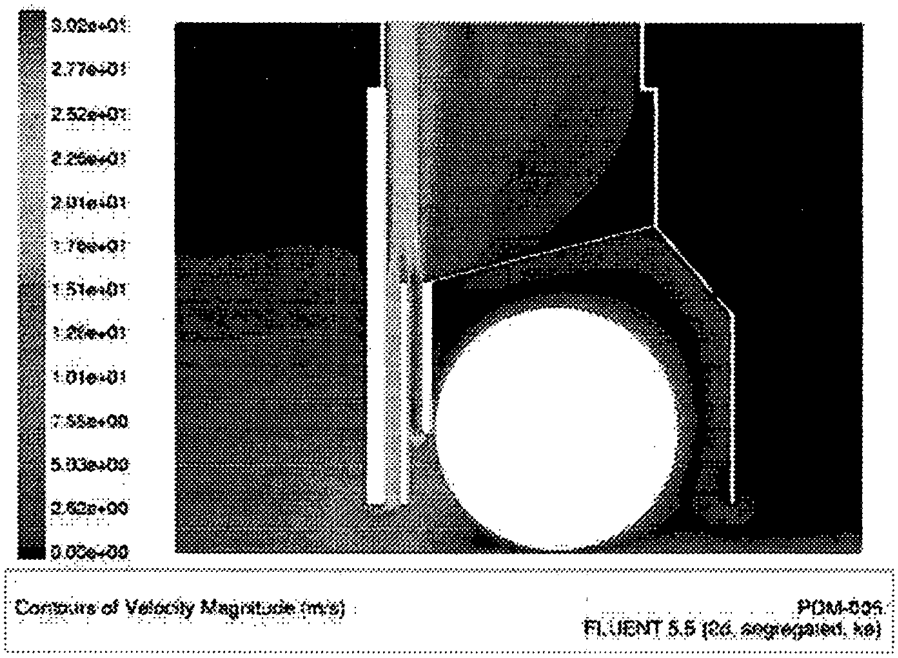

Figure E-2 – Contours of Velocity Magnitude

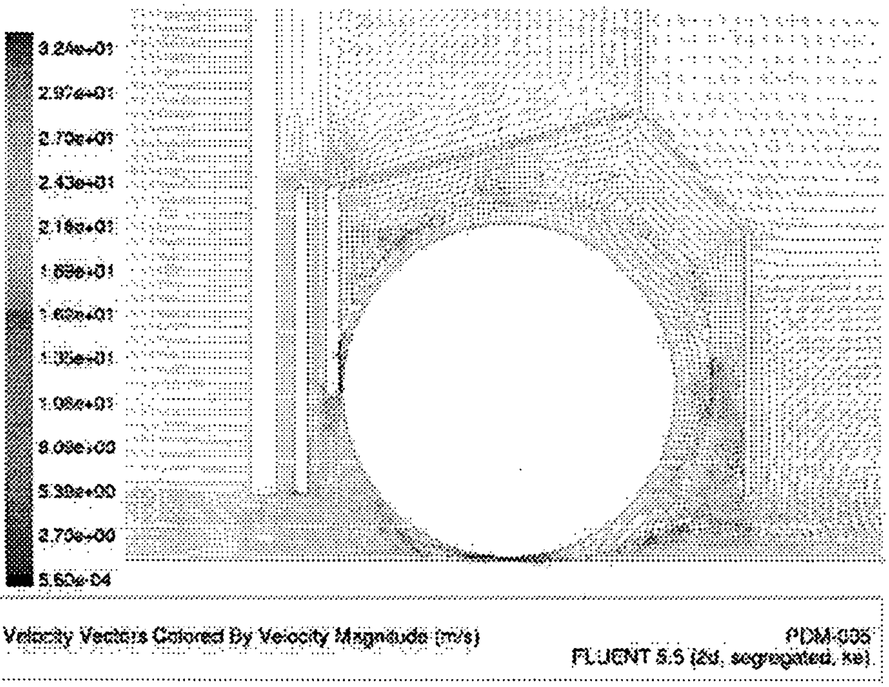

Figure E-3 – Velocity Vectors

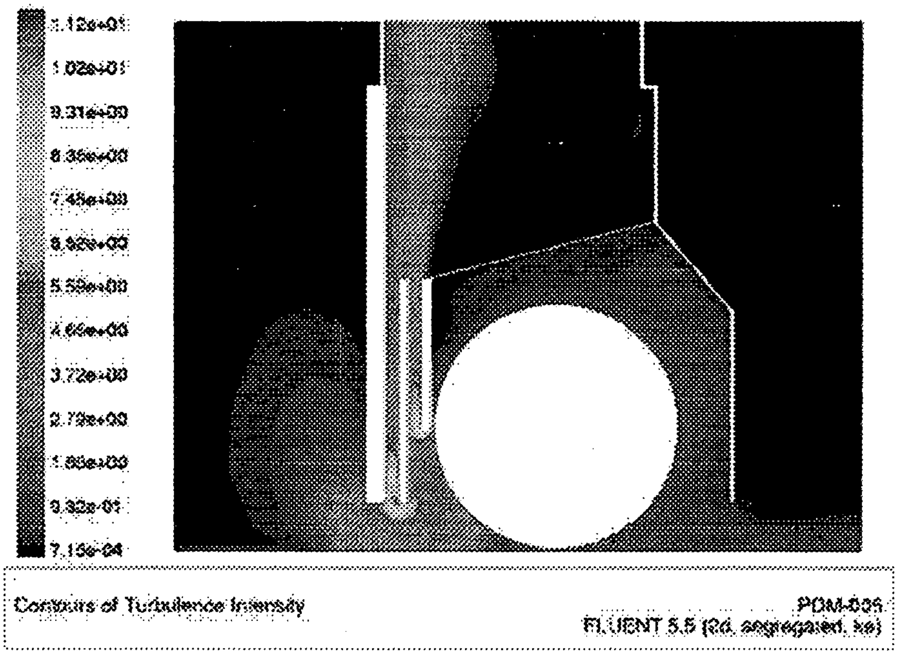

Figure E-4 – Contours of Turbulence Intensity

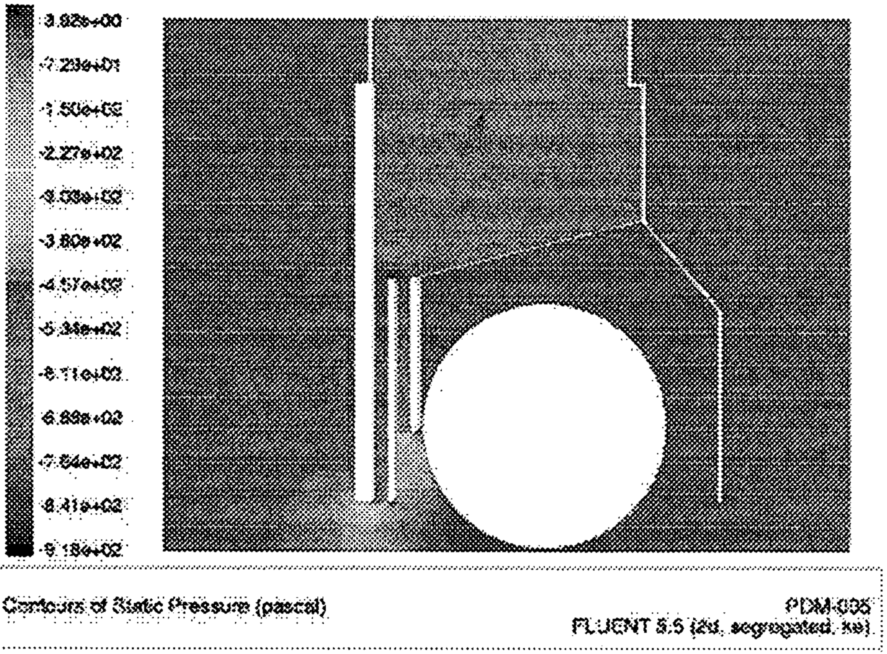

Figure E-5 – Contours of Static Pressure

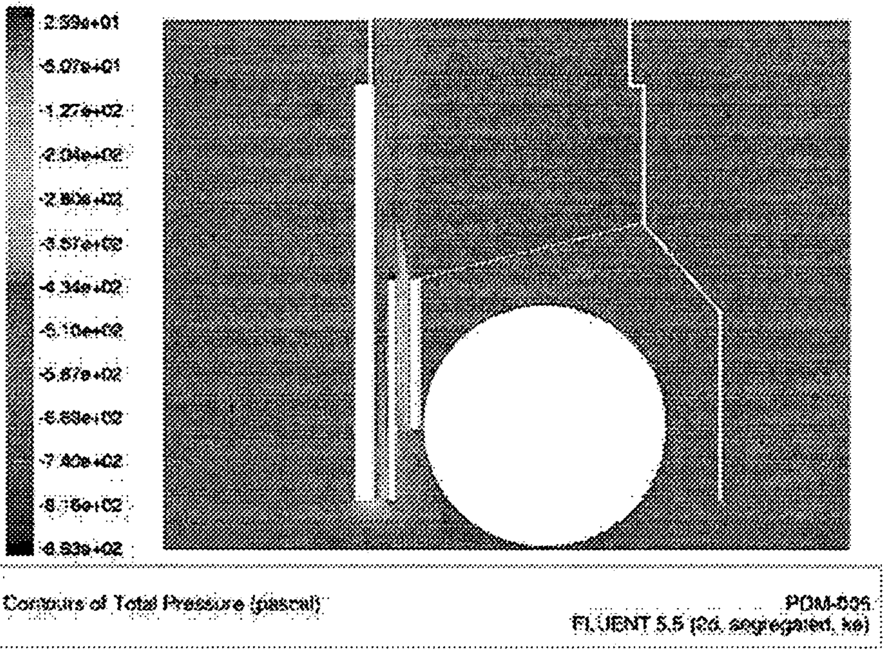

Figure E-6 – Contours of Total Pressure

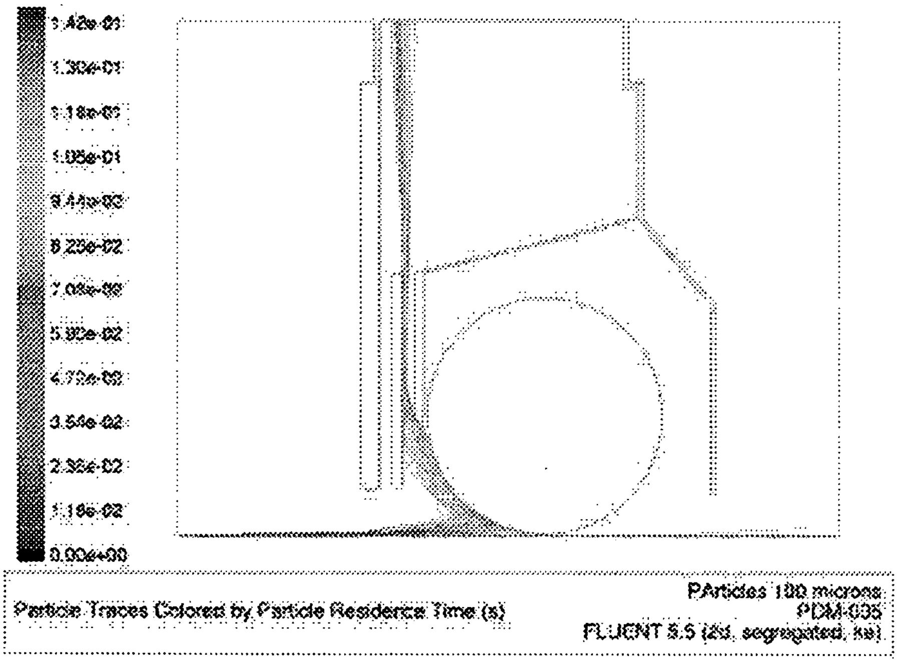

Figure E-7 – Particle Traces: 100 microns

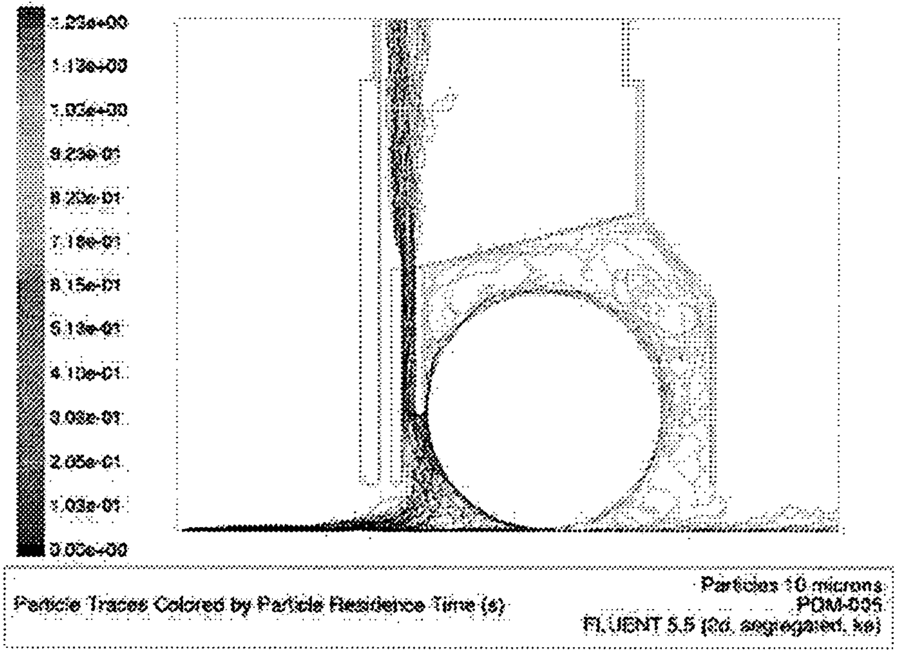

Figure E-8 – Particle Traces: 10 microns

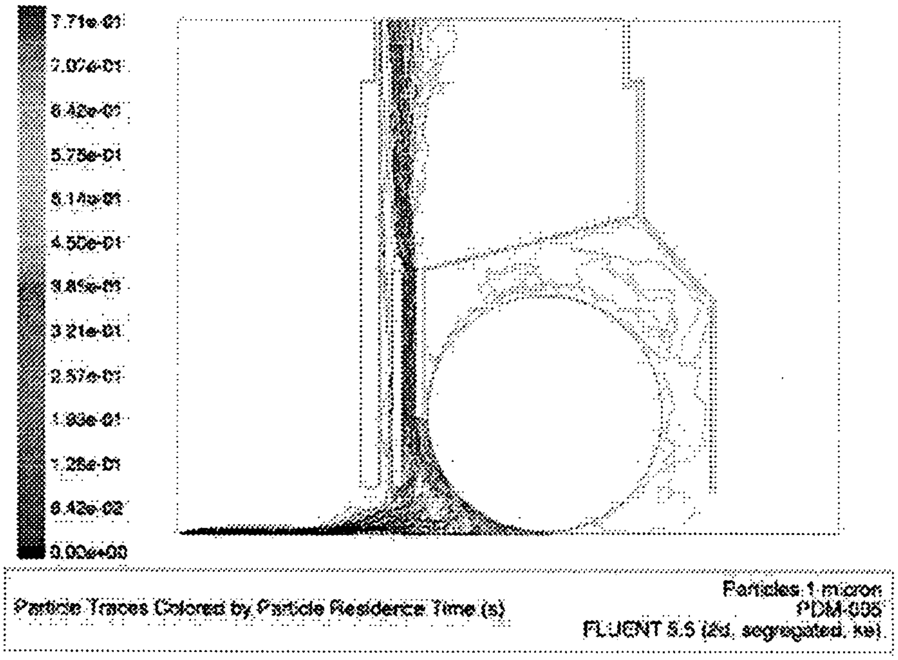

Figure E-9 – Particle Traces: 1 micron

F - Graphical Output PDM-006

Images & Corresponding File Name

- Figure F-1 – Contours of stream function: pdm-006-stream_function.*
- Figure F-2 – Contours of velocity magnitude: pdm-006-velocity_magnitude.*
- Figure F-3 – Velocity vectors: pdm-006-velocity_vectors.*
- Figure F-4 – Contours of turbulence intensity: pdm-006-turbulence_intensity.*
- Figure F-5 – Contours of static pressure: pdm-006-static_pressure.*
- Figure F-6 – Contours of total pressure: pdm-006-total_pressure.*
- Figure F-7 – Particle traces: 100 microns: pdm-006-particles_100_microns.*
- Figure F-8 – Particle traces: 10 microns: pdm-006-particles_10_microns.*
- Figure F-9 – Particle traces: 1 micron: pdm-006-particles_1_micron.*

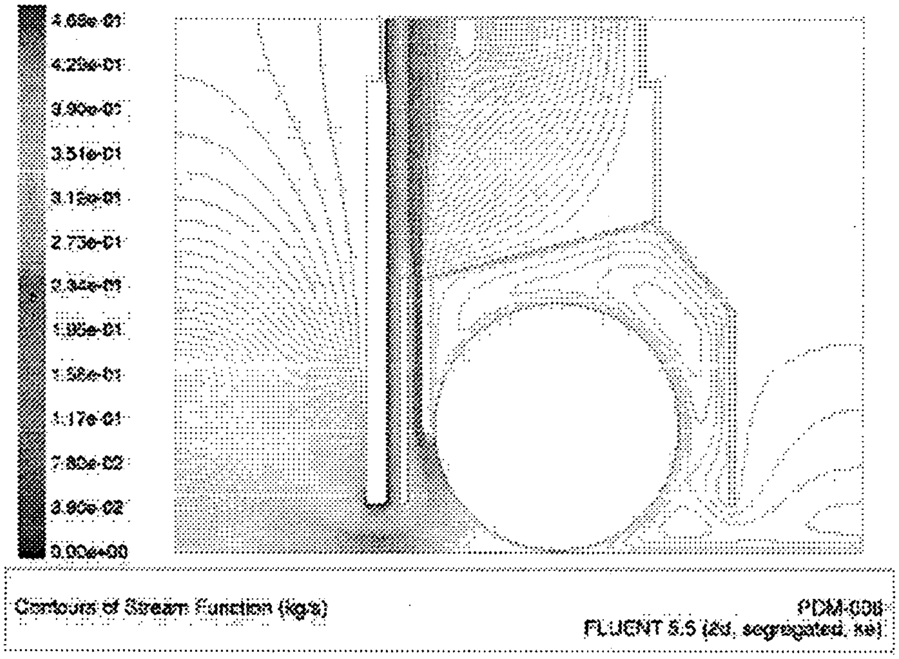

Figure F-1 – Contours of Stream Function

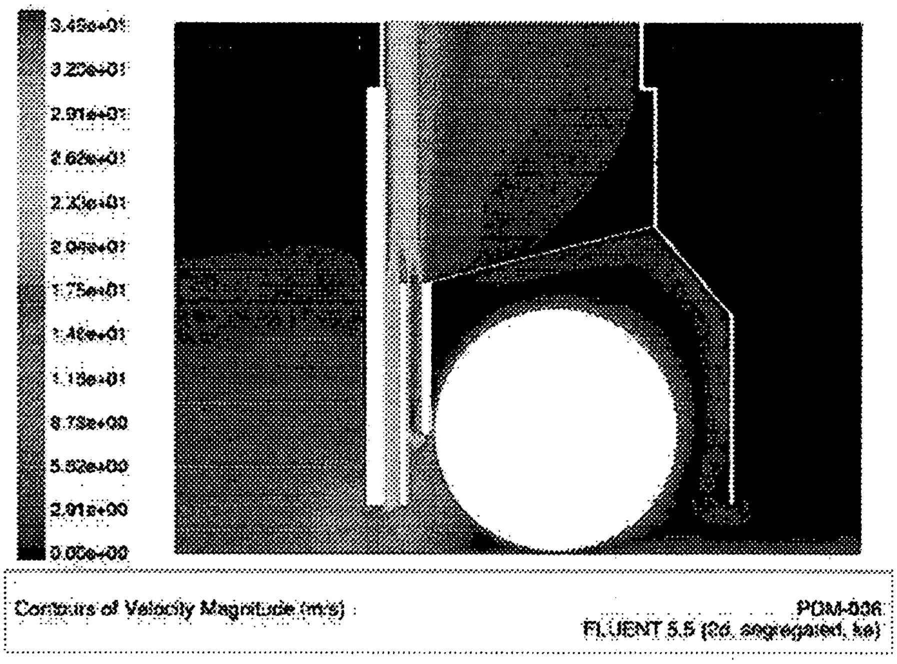

Figure F-2 – Contours of Velocity Magnitude

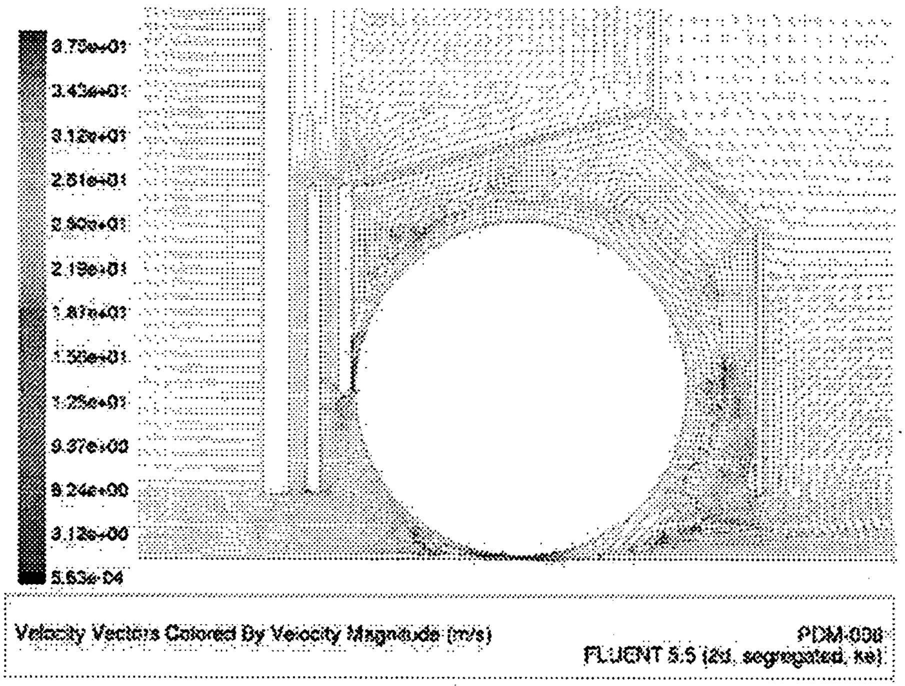

Figure F-3 – Velocity Vectors

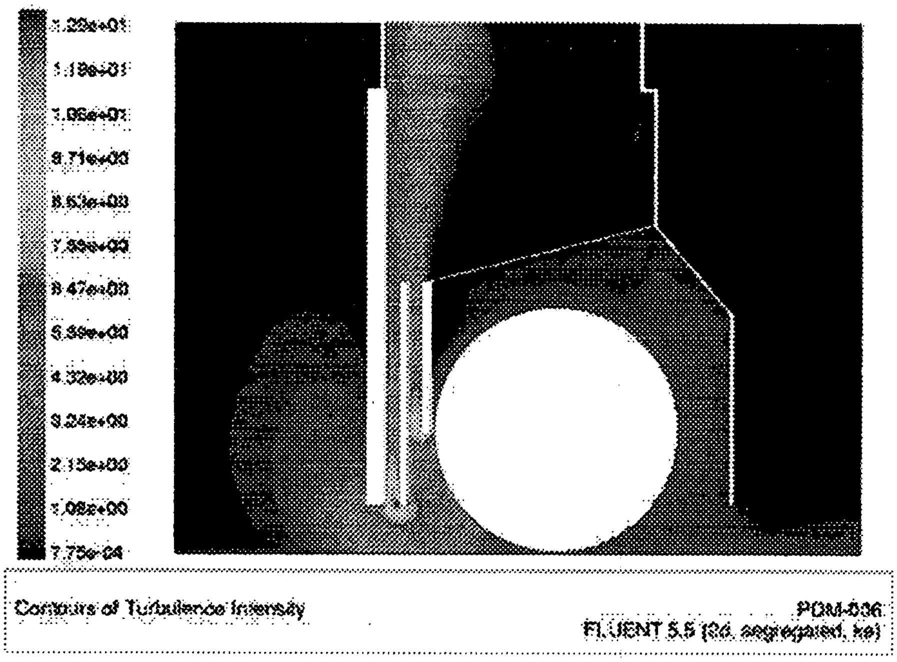

Figure F-4 – Contours of Turbulence Intensity

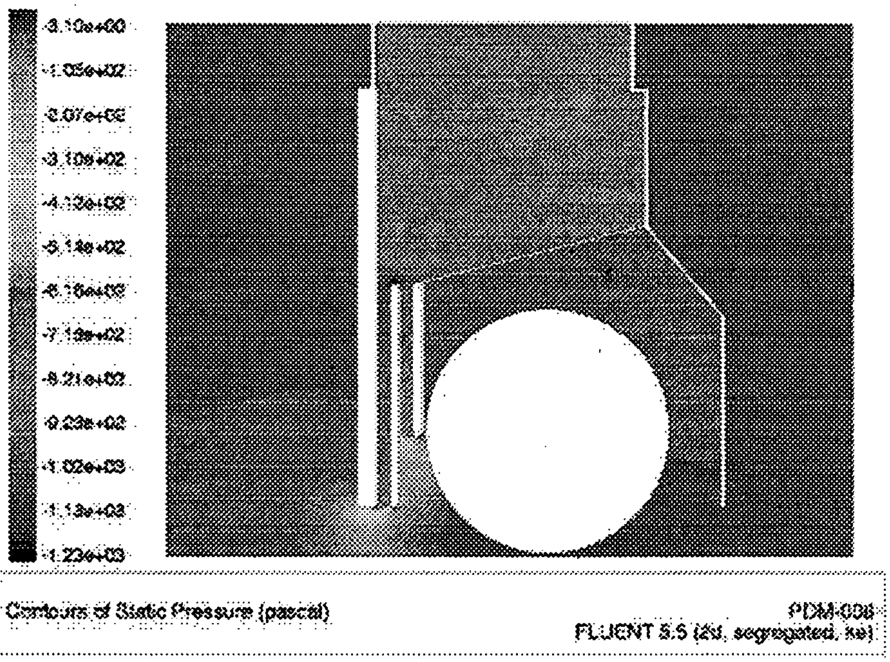

Figure F-5 – Contours of Static Pressure

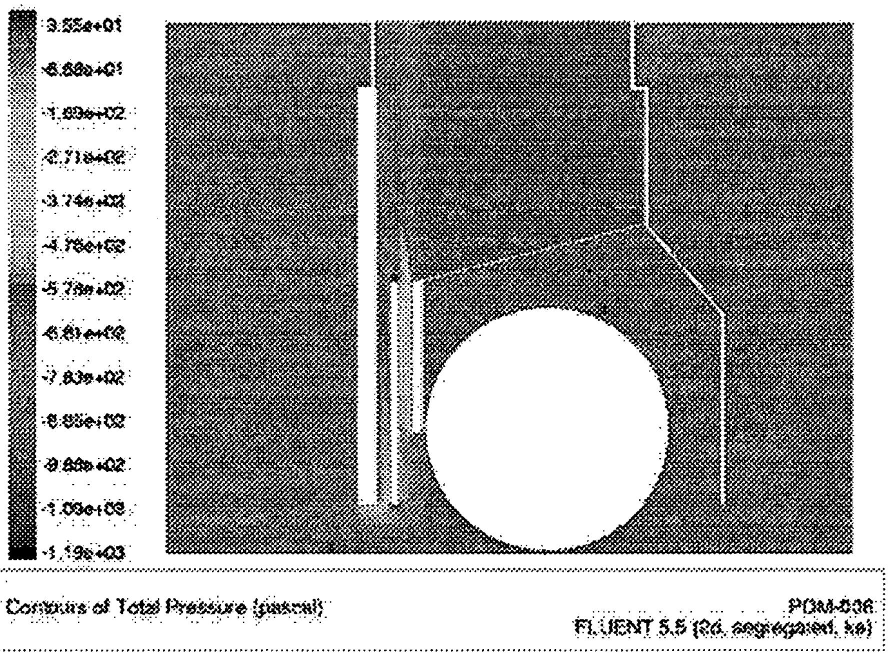

Figure F-6 – Contours of Total Pressure

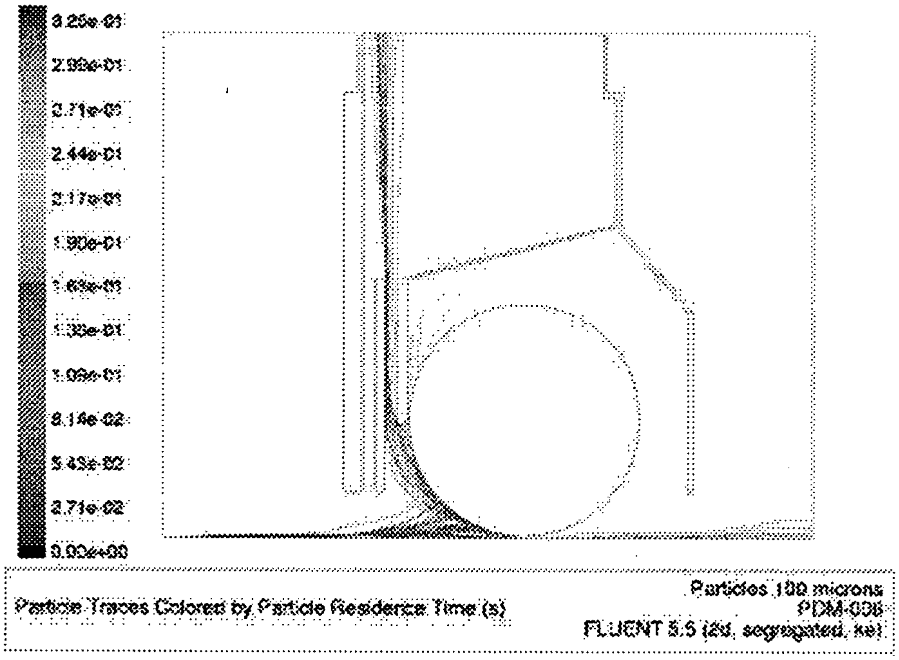

Figure F-7 – Particle Traces: 100 microns

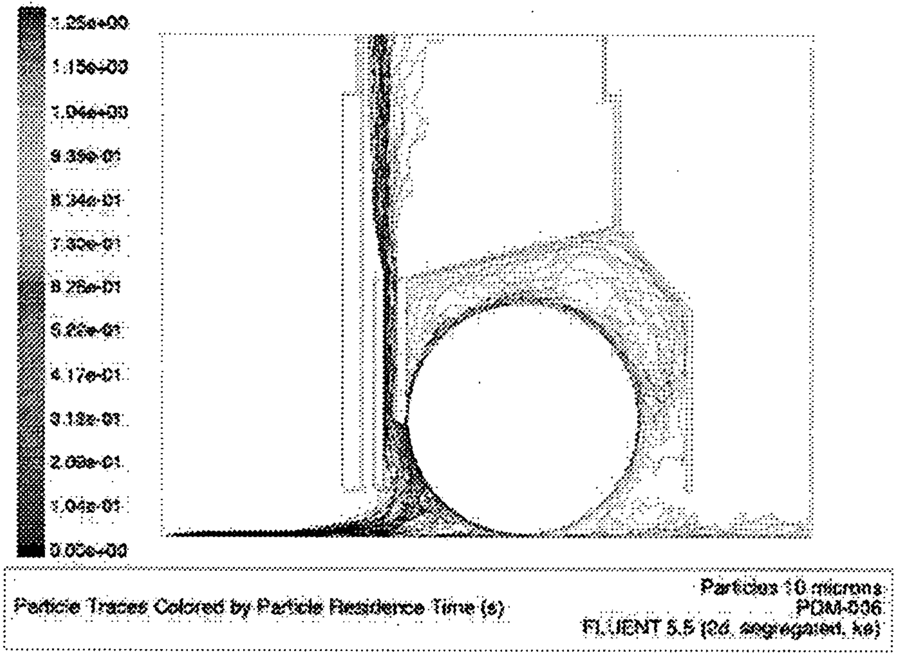

Figure F-8 – Particle Traces: 10 microns

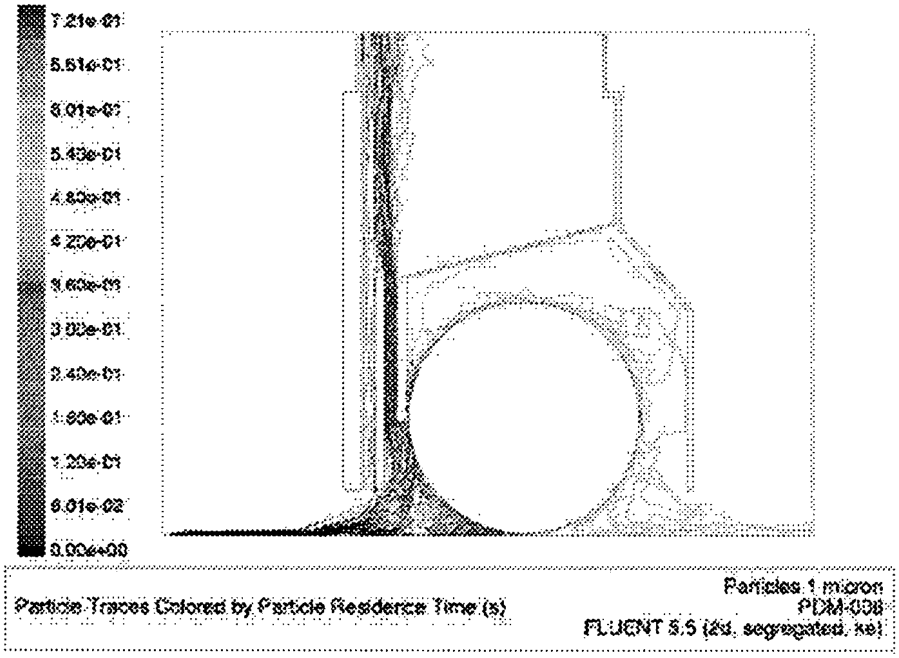

Figure F-9 – Particle Traces: 1 micron

G - Graphical Output PDM-007

Images & Corresponding File Name

Figure G-1 – Contours of stream function:	pdm-007-stream_function.*
Figure G-2 – Contours of velocity magnitude:	pdm-007-velocity_magnitude.*
Figure G-3 – Velocity vectors:	pdm-007-velocity_vectors.*
Figure G-4 – Contours of turbulence intensity:	pdm-007-turbulence_intensity.*
Figure G-5 – Contours of static pressure:	pdm-007-static_pressure.*
Figure G-6 – Contours of total pressure:	pdm-007-total_pressure.*
Figure G-7 – Particle traces: 100 microns:	pdm-007-particles_100_microns.*
Figure G-8 – Particle traces: 10 microns:	pdm-007-particles_10_microns.*
Figure G-9 – Particle traces: 1 micron:	pdm-007-particles_1_micron.*

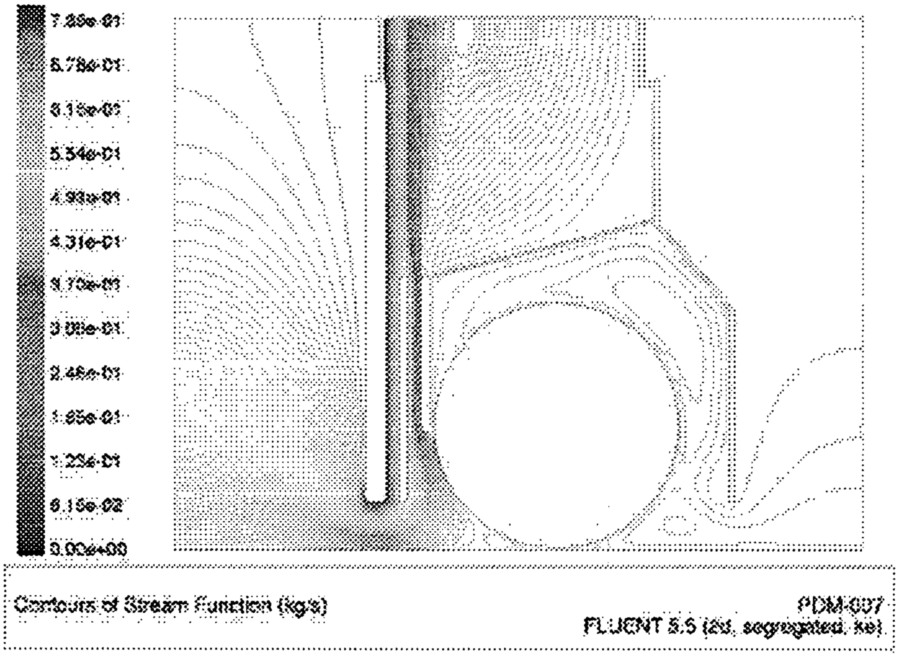

Figure G-1 – Contours of Stream Function

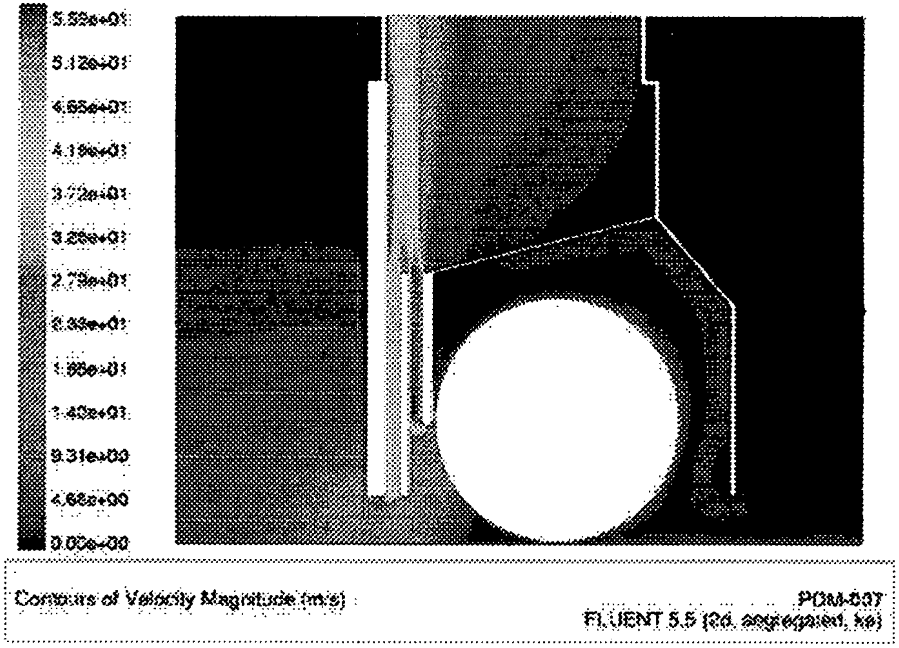

Figure G-2 – Contours of Velocity Magnitude

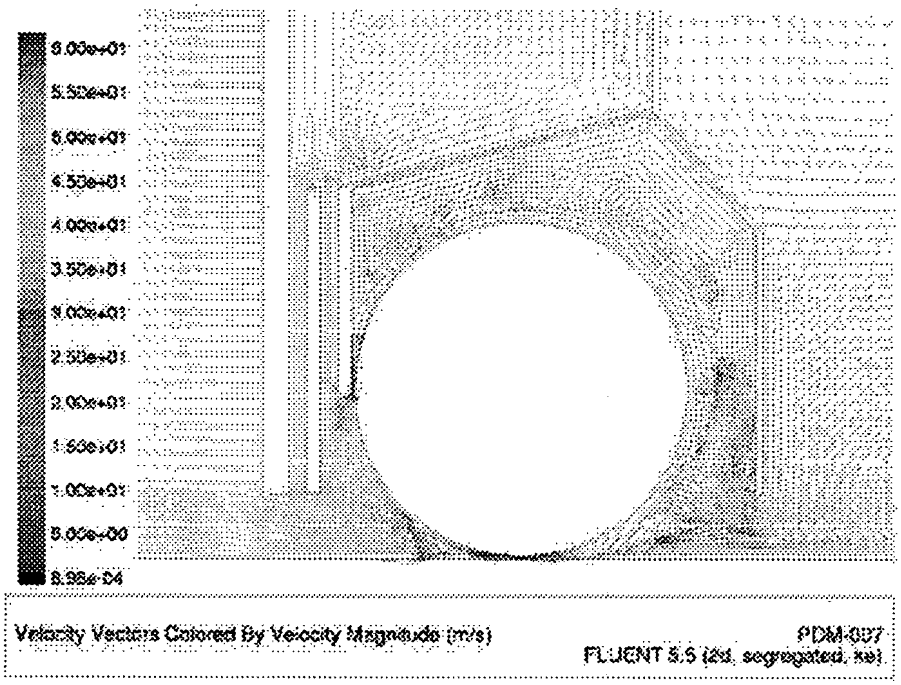

Figure G-3 – Velocity Vectors

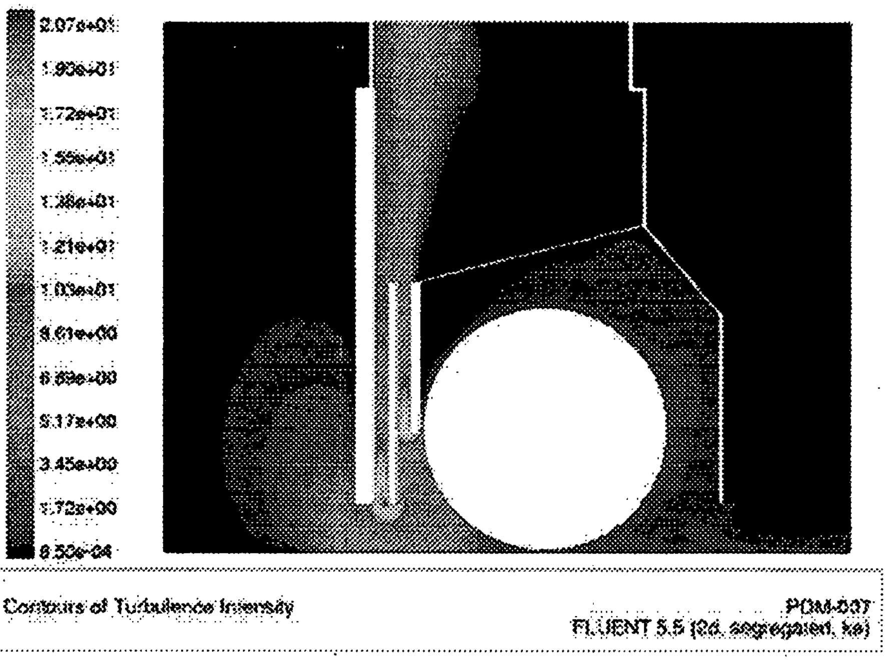

Figure G-4 – Contours of Turbulence Intensity

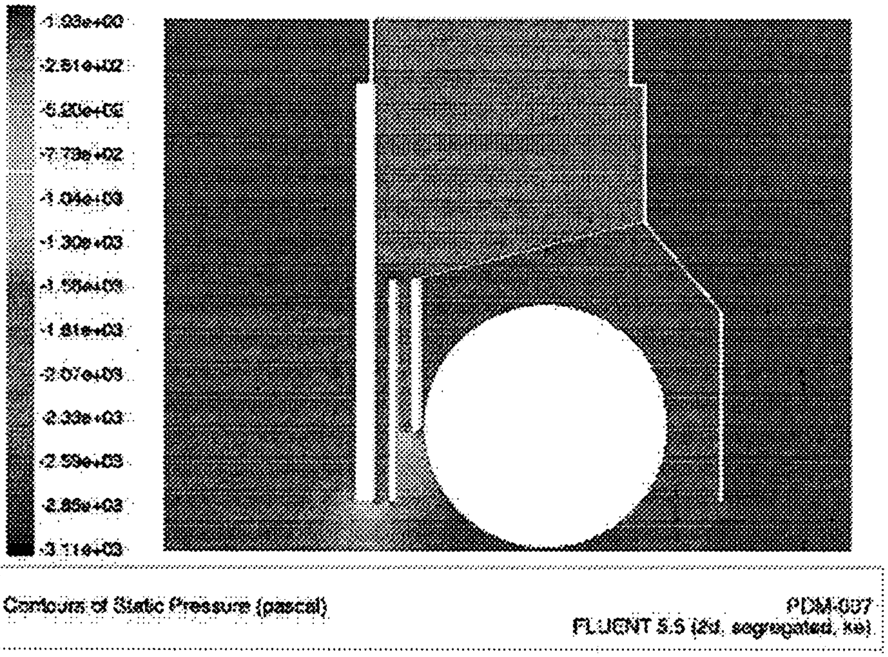

Figure G-5 – Contours of Static Pressure

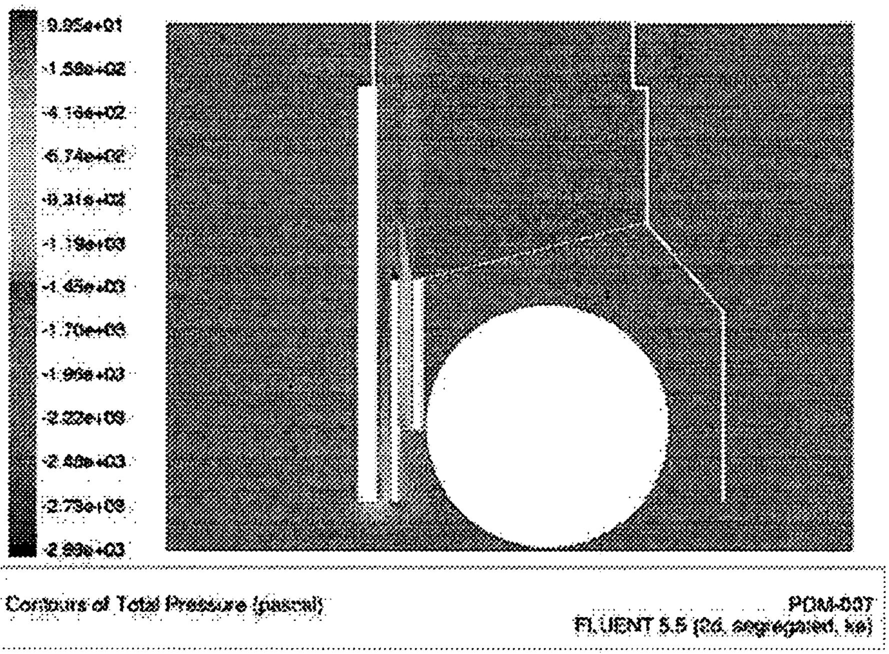

Figure G-6 – Contours of Total Pressure

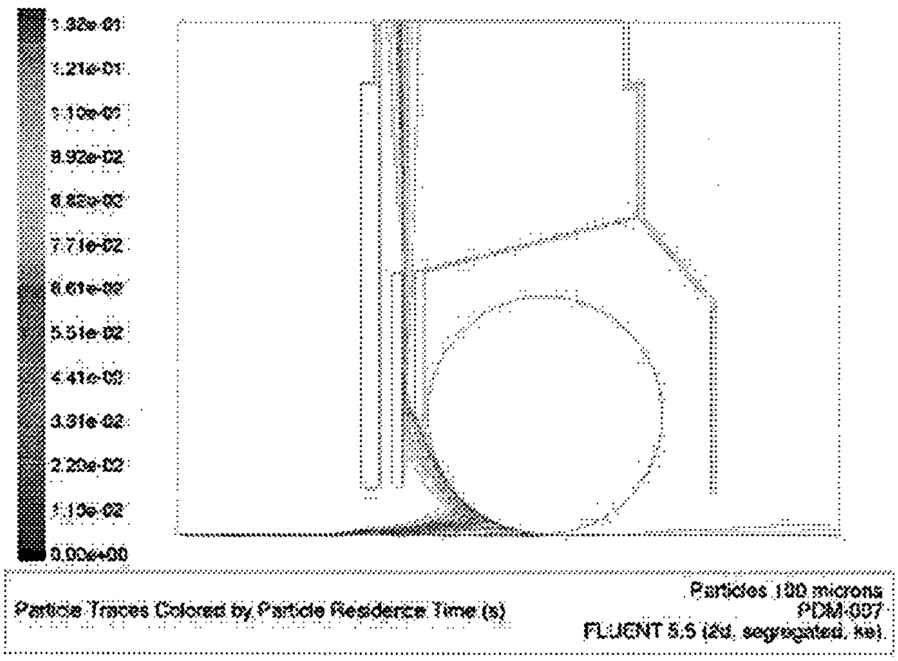

Figure G-7 – Particle Traces: 100 microns

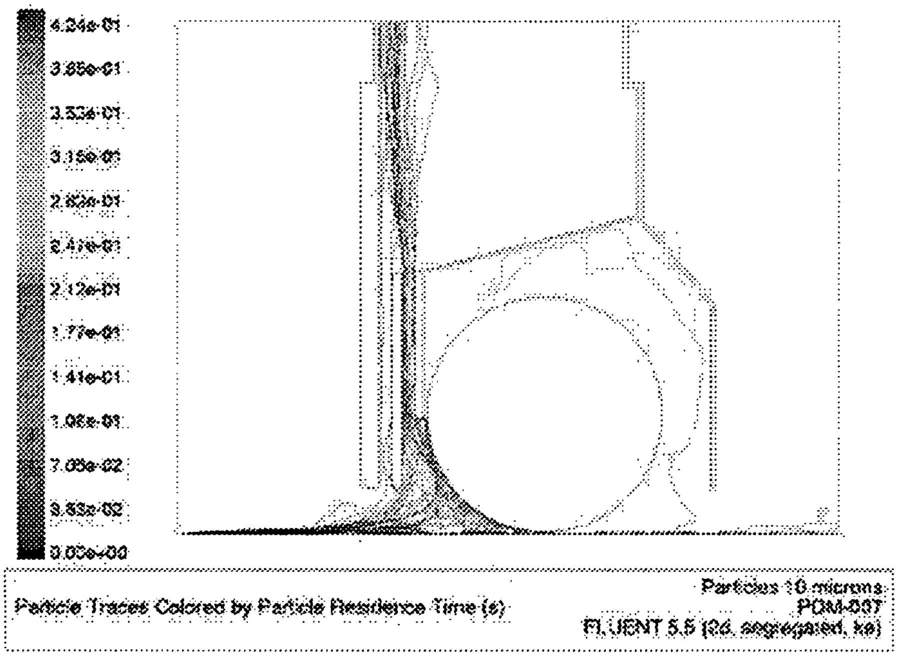

Figure G-8 – Particle Traces: 10 microns

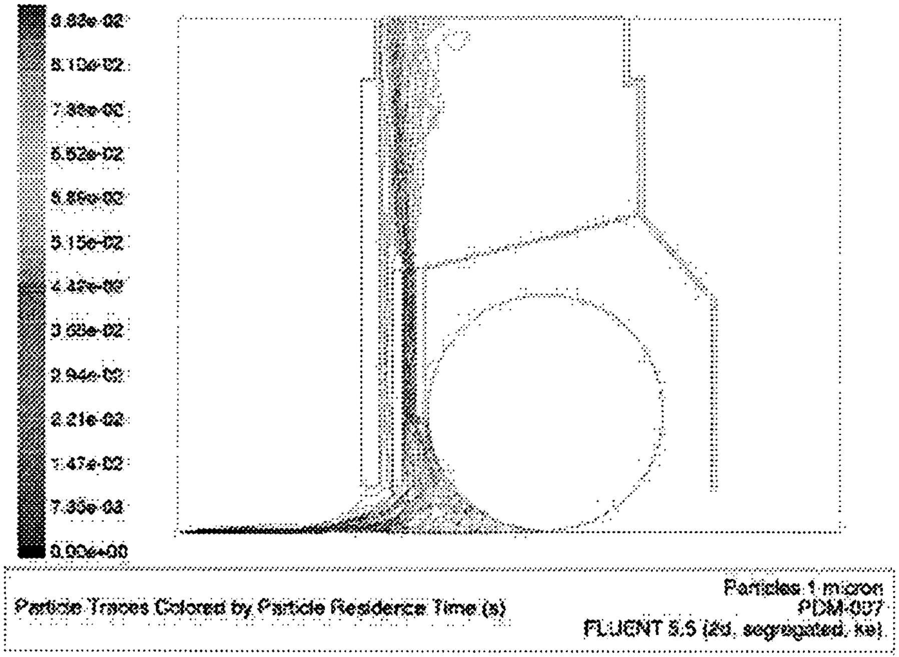

Figure G-9 – Particle Traces: 1 micron